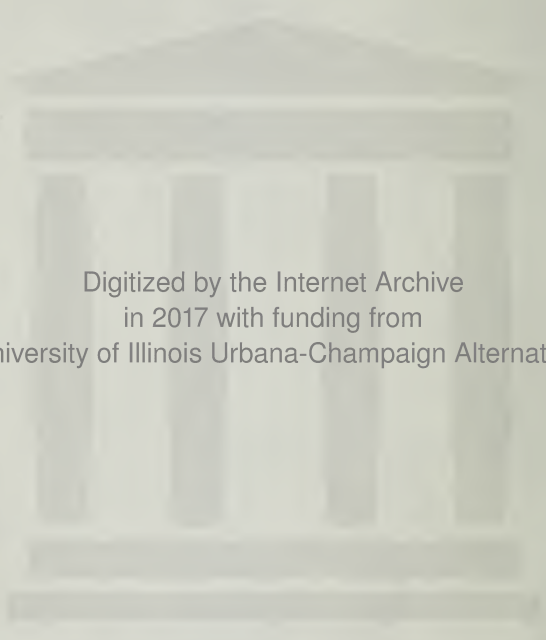


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CATECHISM

OF

PRACTICAL AGRICULTURE

BY

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"No works demand more conscientious care than educational works"

SEVENTEENTH THOUSAND

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PREFACE.

IN arranging the matter of this Catechism of Practical Agriculture, I could not do otherwise than follow the plan I had adopted in the *Book of the Farm*, as I still believe no plan is better suited to teach practical agriculture *off a farm*, to one entirely ignorant of it, than following in the successive seasons the routine of operations performed *on a farm*.

In a work professing to treat of the use of machines, woodcuts are obviously required to give a clearer idea of their construction than any description, however luminous, can possibly do; and these accordingly have been employed to the utmost extent compatible with the elementary character of the work. Figures of certain operations which involve many particulars of detail are also given, in order to show the details at a glance.

Should this little work find its way into the public schools of the country, Teachers might extend the questions largely on every subject treated of, and introduce others on several subordinate subjects that have been purposely omitted in order to retain the work within reasonable compass. It would be advisable for Teachers to exhibit working specimens of hand-implements, and show the manner of using them. Other machines than those figured might be traced with chalk upon a black board, and their superiority or inferiority to the machines given, pointed out. Drawings of the cultivated plants in their different states of growth, and of the varieties of live-stock usually reared, might be placed before pupils with much advantage. Samples too of the various grains and seeds sown on farms would at once impress upon the memory of pupils their identity and use.

By means of such a course of tuition in the school, and exemplified on the neighbouring farms, the occupants of which would doubtless be willing to second the views of Teachers, a large amount of correct agricultural knowledge would be imparted to young boys and girls, destined to earn their livelihood on farms, and which at present is only obtainable by labour in the fields, to the serious neglect of other kinds of knowledge only to be acquired at school. Thus, by combining a professional with the usual education to young farm-labourers of both sexes, a larger portion of their time might be spent at school than is at present, greatly to their own advantage in mental culture, and to that of their masters in securing servants of superior capacity.

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CATECHISM

OF

PRACTICAL AGRICULTURE.

WINTER.

What is agriculture ?

Agriculture is simply the cultivation of crops in the field ; but practically it also includes the rearing of live-stock.

Crops are the plants cultivated on a farm. *Live-stock* are the animals reared on a farm.

What is the time occupied by the cultivation of crops and the rearing of animals ?

Crops are cultivated within the period of one year—the agricultural year—and animals are reared for one or more years.

What is the difference between the agricultural year and the common year ?

The agricultural year commences in October, and, like the common year, is divided into four seasons—Winter, Spring, Summer, and Autumn.

Why is winter placed first in order ?

Because winter is the season in which preparation is made for the work to be done in the other seasons.

It is essential to success in farming, that every operation in the field be executed in its own proper *season*.

PLOUGHING.

Which is the chief preparatory work in winter ?

Ploughing the soil ; but other works of importance in winter are—thrashing and dressing grain, pulling and storing turnips, feeding live-stock, forming dunghills of farmyard manure.

Of what use is ploughing the soil in winter ?

Ploughing the soil in winter pulverises it by the action of the plough, and also by exposing it to the air, and especially to frost.

In what state is pulverised soil ?

Pulverised soil has all its parts loose and dry.

How does the plough pulverise the soil ?

The plough pulverises the soil mechanically, by rubbing against, dividing, and crushing it.

How does frost pulverise the soil ?

Frost freezes the moisture in soils into ice, whose expansive power breaks down the hardest clods into powder.

On what kind of soil is frost most efficacious ?

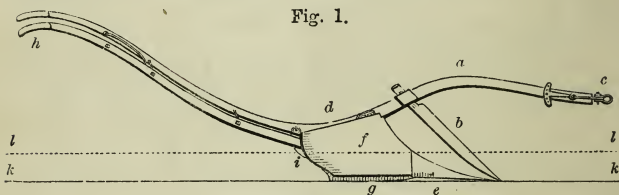
Frost is most efficacious on clay soils, because they are always in a moist state in winter.

Is there any specific difference in soils ?

Yes. Soils are divided into sandy and clayey, according as sand or clay predominates in them. Sandy soils are termed light, because they are easily worked and pulverised, and not easily rendered wet. Clay soils are considered heavy, because they are difficult to work, and are easily wetted. When sandy and clayey soils contain much vegetable matter, they are called loams. A soil is dry that rests upon a porous subsoil ; it is wet when resting upon a subsoil retentive of water.

Why does the farmer use the plough and not the spade, for turning over the soil ?

The use of the spade is more expensive than that of the plough, because human labour is dearer than animal labour.



An Iron Plough.

a is the beam.
b the coulter.
c the bridle or muzzle.
d the body of the plough.
e the sock or share.
f the mould-board.
g the sole shoe.
h the stilt or handles.

i the side-plates, on the opposite side of the body of the plough from the mould-board *f*.
k k, the black line, is the furrow-sole.
l l, the dotted line, is the surface of the ground.
l k is the depth of the furrow.

Wooden ploughs are now much less common than iron.

Of what construction is the plough ?

The plough consists of one beam, one body, and two stilt.

What are the parts connected with the beam ?

The coulter and the bridle.

Of what use is the coulter ?

The coulter cuts off the furrow-slice from the fast land.

Of what use is the bridle ?

The bridle regulates both the depth and the breadth of the furrow-slice, and it is the part of the plough to which the horses are yoked.

Of what use is the beam ?

By the beam the horses draw the body of the plough through the ground.

What parts compose the body of the plough ?

Besides the frame, there are the sock or share, the mould-board, the sole-shoe, and the side-plates.

Of what use is the sock or share ?

The share cuts under and raises up the furrow-slice cut off from the fast land by the coulter.

Of what use is the mould-board ?

The mould-board receives and lays over the furrow-slice at a given angle when cut off from the fast land by the coulter, and raised up by the share.

Of what use is the sole-shoe ?

The sole-shoe supports the weight of the plough upon the ground at the bottom of the furrow, and it answers as a slide.

Of what use are the side-plates ?

The side-plates prevent the earth of the fast land from falling into the body of the plough.

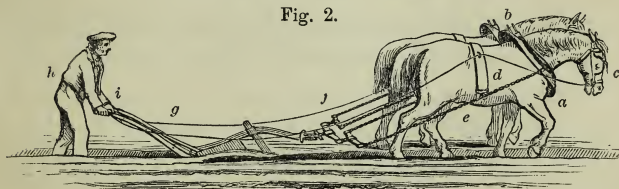
Of what use are the stilts ?

As levers, the stilts enable the ploughman to maintain the correct line of draught, and the required depth and breadth of the furrow-slice, determined by the bridle.

How does the ploughman guide the horses ?

Partly by means of double reins, and partly by the voice.

Fig. 2.



A Pair of Horses, harnessed and yoked, drawing a Plough, while the Ploughman guides it by the Stilts.

a is the collar on the horse's neck.

b the points of the haims on the collar.

c is the bridle on the horse's head.

d the back-band supporting the chains *e*.

e the chains attached at one end to the hook of the haims, and at the other to the short swing-trees *f*.

f are the long master-tree attached to

the bridle of the plough, and two short swing-trees attached to the master-tree and chains.

g are the two reins for guiding the horses.

h is the ploughman guiding the plough and horses by the stilts *i*.

In some parts of the country, blinders are not used on the bridle.

In many parts of England the fore-end of the beam of the plough is supported by wheels, by the elevation and depression of which is determined the depth of the furrow.

Wheel-ploughs go steadily in fine land without stones, but seem incapable of ploughing deep.

Upon what mechanical principles does the plough act ?

The plough acts upon the principles of the wedge and of the lever.

Of what material is the plough made ?

The plough is now made entirely of iron, as being more durable than wood.

How many horses are yoked to the plough ?

Two horses are yoked abreast to the plough ; but when a greater depth of soil than ordinary is required, three or four horses are employed.

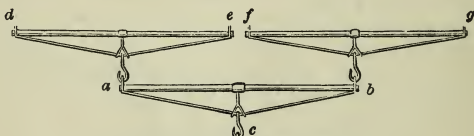
How is the plough-horse harnessed ?

The plough-horse has a collar and haims, a bridle, a back-band and chains.

How are horses yoked to the plough ?

Horses are yoked to the plough by means of swing-trees and chains. The chains are fastened to the haims at one end, supported by the back-band, and fastened to the swing-trees at the other end.

Fig. 3.



Common Swing-Trees of Iron.

a b is the long or master tree.

d e and *f g* are the short trees, each

c is the hook which fixes the master-tree to the bridle of the plough.

hooked to an end of the master-tree at *a* and *b*.

The chains from the haims are hooked into the ends of the short trees at *d e f* and *g*.

Wooden swing-trees are yet much more common than iron.

How many swing-trees are required for the plough ?

Three : the long or master tree, which is hooked to the bridle ; and two short trees, which are each hooked to an end of the master-tree.

Of what materials are swing-trees made ?

Swing-trees are made of wood—sometimes of iron.

When more than two horses are employed, how are they yoked to the plough ?

Three horses are yoked abreast, and four horses are yoked two-and-two, one pair before the other.

What other ploughs are used on a farm besides the common one ?

There are subsoil, trenching, double mould-board, and small ploughs.

Of what use is the subsoil-plough ?

The subsoil-plough stirs the subsoil deep without bringing it to the surface, thereby admitting into it rain and air, to make

useful what might be hurtful in it to plants. It is only used to follow the trench-plough or common plough, to deepen the soil beyond their reach.

Of what use is the trench-plough?

A trench-plough brings up any desired proportion of the sub-soil and mixes it with the surface soil.

What is the breadth of the furrow-slice turned over by the plough?

Not less than 9 inches.

What are the usual depths of ploughing old lea, turnip land, and stubbles?

Old lea is seldom ploughed deeper than 6 inches. Turnip land ploughed for barley receives a depth of 9 or 10 inches; turnip land for wheat receives 7 or 8 inches. Stubbles are ploughed as deep as possible in preparation for turnips and other green crops, commonly 10 inches. Frequently stubbles are ploughed with three or four horses to the depth of 10 or 12 inches, and even more, if the nature of the soil and subsoil admit of it. It is a good rule to plough deep.

Is the ground ploughed into any particular form?

Yes: commonly into parallel narrow divisions named ridges.

Into what breadth are ridges ploughed?

On moist land the breadth of ridges is 12 feet. When drained, or naturally dry, ridges are from 15 to 18 feet in breadth. When the land is perfectly dry, two ridges are put together, making widths of 24, 30, or 36 feet; and these widths may be doubled.

Of what parts does a ridge consist?

A ridge consists of a crown, two flanks, and two furrow-brows. The narrow hollow space between the ridges is named the open furrow.

Are there other modes of ploughing land than in ridges?

Land may be drilled and ribbed.

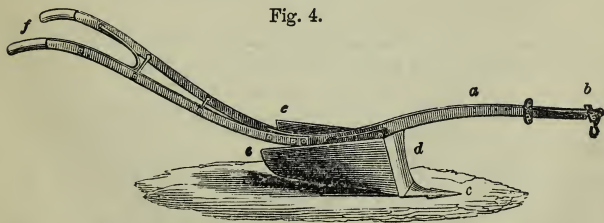


Fig. 4.

The Double Mould-board Plough for Drilling Land.

a is the beam.

b the bridle.

c the sock or share.

d the body of the plough.

ee the two, or double mould-boards.

f the stilt.

It will be observed that this plough has no coulter, because it is not required to cut fast land, the plough being only used in pulverised soil.

How is land drilled ?

Land is drilled by laying two furrow-slices against each other in a triangular form with the plough, or by forming at one time, right and left, two separate half-drills with the double mould-board plough.

How is land ribbed ?

Land is ribbed by laying over small parallel furrow-slices, distinct from each other, with a small plough constructed like the common plough.

The small plough is also used for paring away the soil from the sides of drills.

Of the same breadth, do ridges of different lengths take comparatively the same time in ploughing ?

No : of the same breadth, the shortest ridges take comparatively longer time to be ploughed, because they oblige a greater number of turns at their ends.

What is the length of ridge that loses the least time at the turnings ?

About 300 yards ; because longer ridges fatigue the horses, and cause them to walk slower.

Of what length is a day's work ?

A day's work embraces ten hours, as long as there is daylight to that extent ; and in that time about an acre of ground can be ploughed.

Is a day's work continuous or divided ?

A day's work should be divided into at least two portions, named yokings, because it is found that horses are injured in health and constitution when worked longer than four or five hours at a time.

THRASHING and WINNOWER GRAIN or CORN.*How is separation of the grain from the straw best effected ?*

The separation of straw from corn is best effected by means of the thrashing-machine.

Why has the flail been given up ?

Because by the thrashing-machine the crop is better and quicker thrashed, and at less cost than by the flail.

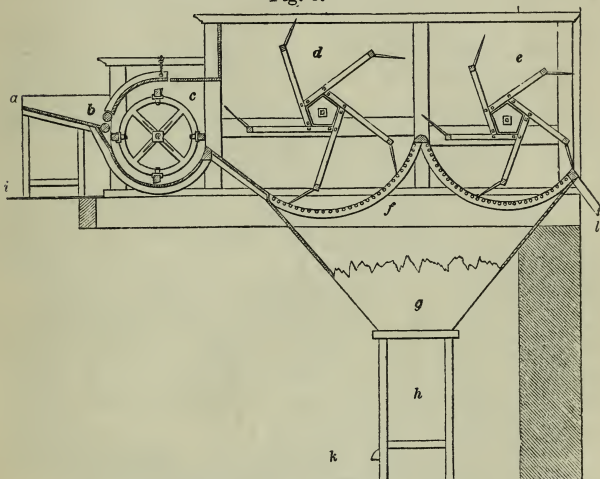
How does a thrashing-machine operate ?

Each sheaf of corn, on being loosened, is placed upon the feeding-in board, from which the rollers draw it in gradually, as the drum beats the grain out of it, and throws both straw and grain to the rake, which removes both across the screen below it, where the grain, leaving the straw, drops down between the spaces of the screen through the hopper into the fanners, which separate the chaff from the grain by means of wind from fans, while the straw finds its way to the shaker, which takes it across its part of the screen and throws it into the straw-barn beyond, leaving the remainder of the grain to drop through the second screen and hopper into the fanners.

How many persons necessarily attend the thrashing-machine when at work?

Four persons may conduct the thrashing by a machine of small power—one to loosen the sheaves for the feeder-in, one to feed them in, one to take away the straw as it is thrown by the shaker, and one to take away the grain as it comes from the fanners; but a machine of six-horse power and upwards requires two persons to loosen the sheaves, two to take away the straw, two to take away the grain, and one to feed in the corn. Seven persons are thus commonly employed at the thrashing-machine. When horses are employed, an eighth person is required to drive them.

Fig. 5.



A Section in length of a stationary Thrashing-Machine.

a is the feeding-in board.
b are the rollers for taking in and holding the sheaf fast.
c is the drum, which beats the grain upwards out of the sheaf.
d is the rake for removing the straw and grain from the drum.
e is the shaker which tosses the straw into the straw-barn *l*.

f f are the screens, which pass the grain through them from the rake and shaker to the hopper *g* of the fanners *h*.

g is the hopper, which receives the grain from the screens, *f f*, and conveys it to the fanners *h*.

h are the fanners, which blow the chaff from the grain by means of fans.

The sheaves of corn are supplied by two women to the man at the feeding-in board *a* in the upper barn *i*. The grain passes through the screen *f f*, the hopper *g*, and the fanners *h*, into the corn-barn *k*, where it is riddled by two women. The straw is thrown into the straw-barn *l* by the shaker *e*, where it is forked up in mows by two men, and tramped down by a woman.

There are other forms of rake and shaker, such as the drum form, but that in the figure is now the most approved. They are moved either by wheels or by sheaves and belts, which apparatus are not shown in the figure.

In the older thrashing-machines the shaker throws the straw over its top into the straw-barn.

How is the thrashing-machine moved ?

The thrashing-machine is moved by means of horses, water, steam, or wind.

What is the best moving-power for a thrashing-machine ?

Wind is now scarcely ever employed, being unsteady and uncertain. Horses are much distressed in driving the thrashing-machine. Whenever steam or water can be procured, they are preferred. Water is the cheapest and steadiest moving-power, where the supply is large and constant. Where water is not constant, steam is the more certain moving power.

Is the thrashing-machine stationary or portable ?

In Scotland the thrashing-machine is permanently fixed in a convenient part of the stading. In England, portable thrashing-machines are not uncommon.

Does the grain come from the thrashing-machine in a state fit for market ?

It is quite possible to erect such a complicated thrashing-machine as will deliver the grain fit for market ; but commonly grain is made ready for market by means of fanners and riddles.

Fig. 6.



Dressing Corn with Fanners.

a is the fanners.

b is a man driving the fanners.

c is a woman supplying the fanners with corn from a heap with a maund, while standing on a stool.

d is a woman taking away the corn as it comes down the head of the fanners, with a small maund.

e are two women riddling the corn as they receive it from the woman *d*.

f is a basket for containing refuse from the riddles.

g is the shovel in the heap of riddled corn for shovelling up the heap.

h is the broom for sweeping the floor.

i is the light grain as it falls below the centre of the fanners.

k is the chaff as it is blown away from the tail of the fanners.

In small farms, one riddler, *e*, is only employed, and she helps herself to corn from the head of the fanners, as does the woman *d*.

What is the process of dressing grain ?

The fanners, on being placed beside the heap of corn to be dressed, are moved by a man ; one woman supplies the hopper

with grain from the heap by means of a maund and the assistance of a low stool; another woman takes away the grain from the fanners in a maund; and two women receive it from her on riddles, upon which they collect, by riddling, the small ill-filled grain and other impurities from the good grain, to one side of the riddles, and throw them into a basket or the bushel-measure. Two such dressings are required by wheat and barley, and one by oats.

After a sufficient dressing, what is next done with the grain?

The grain, on being sufficiently dressed, is measured with the bushel, and put into sacks.

Fig. 7.



Measuring and Sacking Corn.

- a* is the bushel-measure placed beside the dressed heap of corn *b*.
- b* is the heap of corn ready to be measured.
- c* and *d* are two women filling the corn into the bushel by means of maunds.
- e* is a man ready, with the strike in his hand, to level the top of the corn in the bushel.
- f* and *g* are two women holding the sack to be filled.
- h* is the sack-barrow for wheeling away the sacks as they are filled.
- i* are the filled sacks placed properly in a corner of the barn.
- k* are empty sacks ready to be filled.
- l* is a broom for sweeping the floor.
- m* is a wooden shovel for trimming the heap of corn into a convenient shape.

Sometimes only one woman to fill the bushel, and one woman to hold the sack, instead of two, are employed on the score of economy, but the business is best and quickest done in the way here described.

With a want of hands, as in small farms, the smaller number must suffice.

How is grain measured and sacked?

The bushel-measure is placed beside the dressed heap of corn. Two women fill it at the same time with corn by means of maunds. A man levels the corn in the bushel with a strike. Two women hold the mouth of a sack open, and the man, assisted by the women, empties the corn from the bushel into the sack. When 4 bushels of the corn have been put into a sack, the man wheels the filled sack, on a sack-barrow, to a corner of the barn. Two 4-bushel sacks make a quarter of grain.

How are sacks full of corn conveyed to market?

Corn in sacks is conveyed directly to the market town, or to a railway station, upon carts.

How is a horse yoked to a cart ?

The horse is furnished with a bridle, collar, and haims, as for the plough—with a saddle upon his back, and a breeching over his rumps. He is placed between the shafts, and the load is supported upon the saddle by a strong flat chain fastened by each end to the shafts. Draught-chains are hooked to the haims, and breeching-chains to the shafts.

How are markets for the sale of grain conducted ?

They are distinguished as stock and sample markets.

How is a stock-market of grain conducted ?

In a stock-market the grain is presented for sale in sacks, and the bulk of the grain remains upon the carts in the market-place or at the railway station, and thence delivered to the purchaser.

How is a sample-market of grain conducted ?

A sample-market consists in presenting the grain for sale in a small sample by hand. The grain is afterwards delivered to the purchaser direct from the farm.

Is grain disposed of at market solely by measure ?

No. Grain is disposed of by measure and weight of the bushel.

How is grain weighed ?

Grain is weighed with a steelyard, and a suitable one should be in every corn-barn.

What is done with the straw as it comes from the thrashing-machine ?

Straw is forked up and tramped down in regular breadths or mows across the straw-barn. Barley and wheat straw are used for litter, and oat-straw for fodder. One end of the straw-barn should always contain litter-straw, and the other end fodder-straw.

PULLING and STORING TURNIPS.

What are the green crops usually raised on a farm ?

In Scotland, turnips and potatoes ; in England and Ireland, turnips, mangold-wurzel, and potatoes. Besides these, carrots, parsnips, and cabbages are sometimes raised.

How are the various kinds of green crops used ?

Potatoes are chiefly used as human food ; turnips and other green crops are consumed by live-stock.

At what season are green crops taken from the ground for use ?

Potatoes are taken up in autumn, and stored ; mangold-wurzel, carrots, and parsnips, are taken up before frost sets in, and stored ; turnips are taken up in dry weather at any time during winter and stored, but part is stored in autumn.

When are turnips begun to be consumed ?

In October, when the grass begins to fail.

How is the consumption of turnips commenced ?

When turnips are to be wholly consumed by cattle in the steading, the crop is cleared field after field. When part of the

crop is to be consumed on the field by sheep, the other part is removed for cattle.

What proportion of turnips is usually consumed on the field by sheep?

Commonly one-half. Where the soil is naturally rich, and in good condition, one-fourth is consumed; when the soil is in poor condition, the whole crop is eaten on the ground.

In what manner is the proportion of turnips left on the field?

On leaving one-half of the turnips, two drills are taken away and two left alternately; on leaving one-fourth on the field, three drills are taken away and one left.

Sometimes a greater number of drills is left at one place in those proportions; but in consuming the smaller number, sheep distribute their dung and urine more equally over the ground.

Are turnips in any way prepared before being removed from the field?

The roots and leaves of turnips are cut off by means of a knife.

A good turnip-knife is made of part of an old sickle with the point broken off.

a is the left hand of the worker.

b is the root of the turnip to be cut off.

c is the place where the leaves are cut off from the turnip.

Turnips injured by cutting, when stored, lose their juices, and often rot. Care is therefore taken not to cut the turnips when rooting and shawing them.

There are many other forms of knives than this for rooting turnips.

How are the roots and leaves removed by the knife?

The leaves of each turnip are seized by the left hand of the worker: the turnip, on being pulled out of the ground, is held in a horizontal position, when the root is first cut off with one stroke, then the leaves are cut off with another at their junction with the turnip. The severed turnips drop to the ground in heaps, and the leaves are thrown down on the bare ground.

What is the manner of pulling turnips when two drills are alternately left and removed?

A woman goes between the two drills to be removed, and pulls the turnips with her left hand, first from one drill and then from the other. After cutting off the small root, she holds the turnips over the two drills to be left, and drops them in heaps as she severs the leaves with a stroke of the knife, and then throws the leaves on the bare ground. Another woman clears other two drills, and drops the turnips in the same heaps. Sufficient bare ground is thus left, by stripping two drills, for carts to remove the prepared turnips. The leaves are left to manure the ground.

Are turnips given to cattle as removed from the field?

Usually turnips are given to cattle as removed from the

Fig. 8.



Rooting and Shawing Turnips.

field ; but stores of turnips should be made in the beginning of winter at latest.

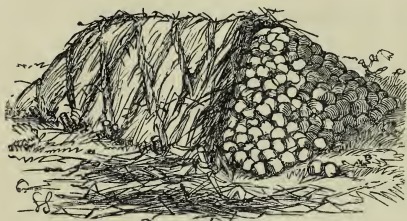
Do carts and horses injure land in rain or frost ?

Wet soil dirties turnips. Cart-wheels and horses feet poach the land in wet weather. Frost hardens turnips so that cattle cannot eat them. Frost freezes the ground, and prevents the pulling and storing of turnips. Turnips, when covered up with snow, are troublesome to remove.

What is the best remedy against the injuries of frost, rain, and snow, to turnips ?

The best remedy against frost, rain, and snow, is to remove the turnips from the ground, and store them in dry fresh weather.

Fig. 9.



A Store of Turnips.

A woman piles up the turnips, as they are emptied out of the carts, in a triangular form, while a man prepares straw and ropes for covering the turnips.

Stores of turnips are sometimes made flat on the top.

If protected from frost, rain and air do no injury to turnips in store.

How are turnips stored ?

They are best stored in triangular heaps

along dry ridges of a field close to the steading. The stores are covered with straw of sufficient thickness to protect the turnips from frost, and the straw is kept on with straw ropes.

Are all the turnips grown on a farm of the same kind ?

No. Generally three kinds are cultivated — namely, white, yellow, and swedes.

Is there any advantage in having so many kinds of turnips at one time ?

Yes. The white kinds growing quickly, are the first ready for use. The swedes keep longest, and are last used. The yellow kinds are used between the white and swedes. The three sorts form a regular succession of good food during the feeding season.

FEEDING LIVE-STOCK.

How are live-stock housed during the winter ?

Cattle and horses live in the steading, and so do pigs and poultry. Sheep are in the fields, either upon grass or upon turnips.

CATTLE.

How are cattle accommodated in the steading ?

Cows always occupy byres. Young cattle are kept in courts, having shelter under sheds. Feeding cattle are placed in byres, courts, hammels, or boxes.

Of what construction is a byre?

A byre consists of single or double stalls, each to hold one or two cows or oxen ; a manger to place the turnips in ; stakes to tie the animals to, by means of an iron chain or a rope, round the neck ; and a gutter to receive the dung and urine from the animals.

- a* is the outer wall of the byre.
b is the manger for holding the food.
c is the stake, fastened at one end to the wall *a*, and at the other into a stone in the floor.
d is the travis of the stall.
e is the gutter to receive the dung and urine of the animals.
f is the floor of the stall.
g is the chain by which the animal is fastened by the neck to the stake *c*.

Travises—the divisions between the stalls—are generally made of wood, but sometimes of flagstones.

How are courts constructed?

Courts consist of a large enclosed area, with covered sheds for shelter, having mangers for turnips, racks for straw or hay, and troughs for water.

- a* is a building of stone and lime.
b is a scantling of wood.
c a rod of iron to fasten the wood to a wall with nut and screw.

Throwing turnips upon the dunghill in courts to cattle is slovenly practice.

What are hammels?

Hammels have a covered shed, with racks for straw and hay ; with a doorway into a small open court, fitted up with mangers for turnips, and a trough for water.

- a b* is a shed for four hammels, each having a doorway into an open court *z*, fitted up with a manger for turnips, and a trough for water.
e and *f* are stores for turnips, to be used by the cattle occupying the hammels.

Gates admit access into the courts *z* from the road in front of *e* and *f*.

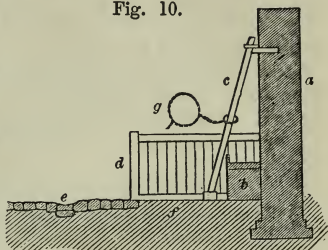
What are boxes?

Boxes are a series of sparred wooden cribs in a shed, large enough to contain one ox loose in each crib, with a manger for turnips, and a trough for water.

What is the comparative situation of animals in byres, courts, hammels, and boxes?

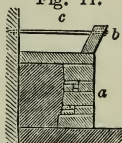
In byres, cattle tied by the neck are obliged to remain always

Fig. 10.



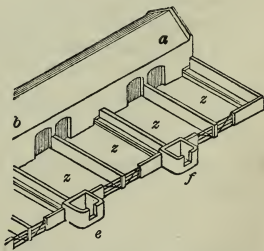
Section of a Stall of a Byre.

Fig. 11.



Section of a Manger for Turnips, in Courts or Hammels.

Fig. 12.



Bird's-eye View of Hammels.

on the same spot, under cover. In courts, cattle have much room to walk in the open air, with liberty to go under cover. In hammels, cattle have but a small space in the open air, with liberty to go under cover. In boxes, cattle have room in their cribs only to turn round on, under cover.

How is food given to cattle ?

Food is given to cattle three times a-day, at fixed hours—at morning, noon, and evening.

What is the usual food of cattle in winter ?

Turnips, with potatoes, oilcake, or bean-meal, form the food of cattle in winter.

How is food distributed to cattle of different states and ages ?

Cows are allowed a small quantity of turnips until they calve, when the quantity is increased to cause flow of milk. Young cattle have as many turnips as they can eat, in order to promote their growth. Feeding cattle have as much food as they can eat.

The quantity of turnips consumed by an ox in the course of the feeding season of six months, depends on the quantity of other kinds of food given it at the same time. With other food, 9 or 10 tons of turnips may suffice.

What quantity of potatoes and oilcake is given to a feeding ox ?

About a bushel of potatoes, and from 3 to 7 lb. of oilcake a-day are given to an ox, according to its size ; and bean-meal is given without stint.

In what state are the oilcake, turnips, and potatoes given to cattle ?

The oilcake is broken small by a hand-machine ; the turnips are sliced with a slicer or spade ; the potatoes are given whole.

Oilcake is sometimes broken with a hammer, or with a power-machine.

Is straw or hay given to cattle ?

Straw is put into the racks every day at stated hours, and the cattle eat it, and drink water, between the times they eat turnips. Cattle seldom receive hay.

What sort of straw is the best fodder for cattle to eat ?

Oat straw and bean straw are the best fodder for cattle. Barley straw and wheat straw are only fit for cattle litter.

When is litter given to cattle ?

Litter is strewn every day in the byres, hammels, boxes, and courts, in such quantity as keeps the cattle clean and dry.

Who takes charge of the feeding and littering of cattle ?

The cattle-man.

SHEEP.

How are turnips given to sheep ?

Turnips are given to sheep on the ground upon which they have grown, or upon pasture.

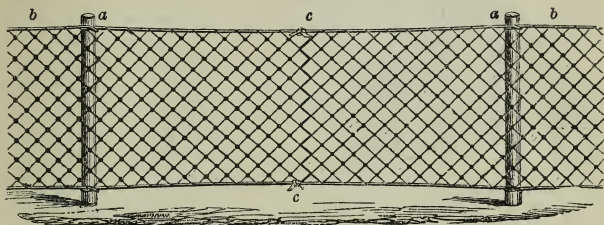
Have sheep liberty to all the turnips of a field at once ?

No : sheep are confined upon as much of the turnips as will serve them about a week.

How are sheep confined upon any given space of turnips?

Sheep are confined among turnips with movable nets or with hurdles. The nets are made of cord, and supported 3 feet high by stakes driven into the ground with a wooden mallet. The hurdles are made of wood, and set upon the ground in an inclined position backward, supported by wooden stays, fastened with pins at one end to the hurdles, and at the other end to short stakes driven with a wooden mallet into the ground.

Fig. 13.



A Sheep-Net set upon Stakes.

a a are stakes of wood, 4 feet long, driven into the ground by means of a wooden mallet.

b b are nets stretched along the face of the stakes next the sheep. The top and bottom cords of the net are

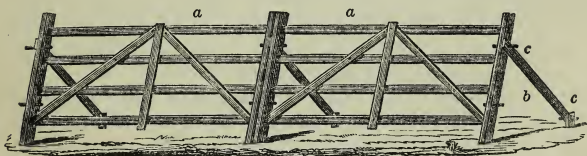
wound round and made fast to the stakes by means of a particular knot named the *shepherd's knot*.

c c is the fastening together the ends of two nets.

Care is taken in setting sheep-nets not to stretch them too tight, because, on being wetted with rain, they would be broken by the contraction of the cords.

One man can shift and set sheep-nets from one break of turnips to another, after the stakes and nets have been taken to the field.

Fig. 14.



Wooden Hurdles set up.

a a are two hurdles set, inclined away from the sheep, consisting each of two posts, four rails, one brace, and two diagonals.

b b are stays which hold the hurdles in that position.

c c are pins which fasten one end of the stays to the hurdles, and the other end to short stakes, driven into the ground with a wooden mallet.

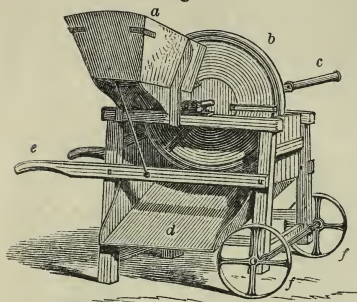
Two men are required to set up wooden hurdles of the above construction, and carts must be employed to carry them any distance. In England, hurdles are made light and strong, of peeled oak-saplings, and are easily set up by one man. They are held together with withes.

Do sheep eat turnips as they grow upon the ground?

Sheep eat white turnips, as they grow, at the beginning of

the season. The harder yellow turnips and swedes are sliced with a turnip-cutter, and served to the sheep in small wooden troughs.

Fig. 15.



The Disc Turnip-Slicer for Sheep.

vertical knives is useful for a few sheep, such as tups and show sheep, in a grass field by themselves.*

Do sheep receive any other kind of food than turnips?

Sheep receive oilcake or oats, with salt, in small troughs, along with turnips.

Do sheep receive fodder when on turnips?

Sheep have fresh oat-straw every day, in racks, when on turnips. Ewes receive hay in winter on the snow.

Do all ages of sheep receive turnips in winter?

No. Ewes in lamb have pasture reserved for them in winter—turnips making them too fat for bringing forth their lambs in safety. Before lambing, ewes receive turnips, to cause a flow of milk. Young sheep and fatting sheep receive turnips all winter.

In case of snow, or very wet weather, is it proper to allow sheep to remain upon turnips on the land?

Unless the soil is dry, sheep are better in a dry grass field, receiving sliced turnips and oilcake during heavy rain; and hay and oilcake during a great fall of snow.

Who takes the charge of sheep at all seasons?

The shepherd.

HORSES.

How are work-horses accommodated in the steading in winter?

Horses occupy the stable. Young horses occupy courts or hammels.

Who has the charge of work-horses?

The ploughmen, who each work a pair of horses.

* A figure of this simple turnip-cutter may be seen by those who wish to have one, at page 215, vol. i., of my *Book of the Farm*.

How is a stable fitted up for horses ?

A stable is made up with stalls having strong heel-posts and travises to separate the horses, a rack for hay and a box for corn.

- a a* are two cast-iron heel-posts.
- b b*, are the boardings of the travises, and head-posts to keep the boardings in their places.
- c* is the rack for straw or grass, or hay placed low.
- d* is the corn box.
- e* is a bar of wood across the rack *c* to prevent the horse tossing out the hay.
- f* is the floor of the stall.
- g g* is the gutter for carrying away the urine.

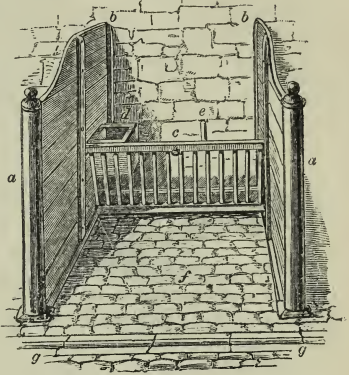
A ring is fastened to the upper rail of the rack *c*, for the stall-collar of the horse to pass through, and be held in its place by a sinker.

The boardings should be sunk at bottom into a groove of stone rising a few inches above the level of the floor *f*.

The gutter *g g* is best made of hewn stone.

There are other ways of fitting up work-horse stalls, but this is the simplest, strongest, and most open to the air.

Fig. 16.



A Stall for a Work-Horse Stable, furnished with Rack and Corn-box, and Cast-iron Heel-posts.

What is the usual treatment of work-horses in winter ?

In the morning early the stable is cleared of foul litter, and the horses are groomed and fed with corn. At noon, on return from the forenoon's yoking, the horses are again fed with corn ; and from the afternoon's yoking, they are again groomed. In the evening they are thoroughly groomed and littered, and fed either with corn or a mash. Fodder is given at every return to the stable, and in the evening for the night.

What is the corn given to work-horses ?

Oats is the corn given to work-horses, and in a whole state, but bruised oats afford them most nourishment.

How is a mash made for horses ?

A mash is commonly made by boiling in water, in a large boiler, Swedish turnips, barley, beans, and a little salt, the whole covered with cut straw or hay, which is cooked by the steam arising from the boiling of the turnips. The cooked mash is put into a large tub to be cooled, and thence divided into hand-troughs in feeds amongst the horses.

Straw-cutters are made of various forms, and are driven by hand or power.

How are the young horses in the hammels fed ?

Young horses have straw for fodder, and a feed of bruised oats every day, and a mash once a-week.

PIGS.

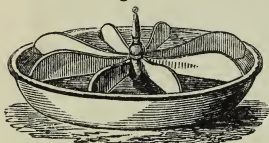
How are pigs accommodated in the steading ?

Feeding pigs are put into sties, each sty having a covered shed and small court, with one trough for food, and another for water. Young pigs go about in the day, and rest at night in a shed provided for them. Pigs love warmth.

How are young pigs treated in winter ?

Young pigs get leave to go about, and feed on raw potatoes and turnips ; and a drink of gruel or slops from the house is put into a trough for them in any of the open courts.

Fig. 17.



Circular Cast-Iron Pig-Trough.

This is a very convenient form of trough for the drinking food of pigs, to be placed upon the litter in any of the courts. Its subdivisions, which are fixed, prevent one pig intruding upon another.

Troughs for sties are made of a rectangular form, of wood, stone, or cast-iron.

How are pigs fed in winter ?

Aged pigs are fed to be cured into ham. They are fed with boiled potatoes or Swedish turnips, and with barley and pease meal made into thick gruel, three times a-day—at morning, noon, and evening.

POULTRY.

How are poultry accommodated in the steading ?

Commonly poultry are very ill-housed in farm-steading. A poultry-house should be dry and warm, placed near a boiler-house, byre, or stable, and exposed to the sunlight.

What are the different kinds of poultry kept on a farm ?

Turkeys, common fowls, geese, and ducks, are usually found on a farm ; as also pigeons.

Are all poultry treated alike ?

No : Geese and ducks, not requiring to roost, have a dry, clean, straw-littered floor to stand or rest upon. Turkeys and common fowls, requiring roosts, are provided with them. Being of very different habits, geese and ducks occupy a separate apartment from turkeys and fowls.

How are poultry fed in winter ?

All poultry are fed at regular hours three times a-day—at early morning, noon, and afternoon. No farm-produce is better for poultry than boiled potatoes, thick oatmeal-porridge, and corn. Regularly fed with all or either of these foods, poultry are fit for use at all times, and eggs every day obtained from young pullets. Better have a small number of poultry well cared for, and well fed, than a large number neglected and ill fed.

Which is the best breed of fowls ?

The Dorking breed is esteemed the best ; and the old Hamburg breed is also good. Cochins are large but coarse, and getting into disfavour. Spanish hens are great layers, but

otherwise not equal to Dorkings. There are several varieties of Dorking, but the speckled is the most esteemed.

Which is the best breed of turkey ?

The Norfolk breed with black feathers.

Which is the best breed of ducks ?

The Aylesbury breed is deemed the best, having white feathers.

Which is the best breed of geese ?

The common breed of geese is yet the best.

How are pigeons accommodated in the steading ?

The dove-cot is placed in a warm chamber—as at the end of a byre or stable, in the roof.

How are pigeons fed ?

They are fed along with the poultry, and on the same kinds of food ; and they repay good feeding and warmth, by their earlier and greater fecundity.

MANURE.

How is farmyard manure managed in winter ?

The manure from the byres and stables is wheeled daily and spread upon the dunghills, in the open courts, or upon separate dunghills. The manure in the boxes is at times taken away and made into dunghills. Separate dunghills are sometimes covered with a roof, to prevent the rain washing away the soluble parts of the manure. The manure in the open courts and hammels, being always tramped hard by the cattle, is allowed to remain in them until driven out to the fields into dunghills.

How is the manure from courts and hammels treated on being driven to the fields ?

The manure in courts and hammels is driven to the field in frosty weather, and formed into a dunghill. The dunghill is turned over for further fermentation a short time before the manure is applied to the land.

What are liquid-manure tanks, and their use ?

Tanks are pits built in the ground for holding the liquid manure, such as urine, as it comes from the open courts, byres, and stables, through conduits under ground, until the liquid manure is used.

How is liquid manure used ?

Liquid manure is applied directly to the land from a barrel mounted on wheels, or it is spread over the ground by means of hose in connection with pipes laid under ground from the tanks.

Are there other sources of manure besides the dung and urine of animals ?

There are many substances which might be converted into manure by being formed into composts, such as decaying potato-stems, weeds, scourings of ditches, turf, peat-moss, leaves, road-scrappings, flesh of dead animals. These, on being mixed together, and fermented with lime, rape-cake, or manure from the stables, and watered with liquid manure, make large composts, and afford excellent manure.

SPRING.

What is the nature of farm operations in spring?

The farm operations of spring are—to prepare the ground for the seed to be sown in it, and to attend to live-stock while bringing forth their young. The crops sown in spring are spring-wheat, beans, tares, oats, potatoes, barley, and grass seeds.

SPRING-WHEAT.

What is the earliest crop sown in spring?

The first crop sown is spring-wheat. As the sheep clear the ground of turnips, it is ploughed into ridges, and sown with wheat.

How is land ploughed for spring-wheat?

Land for spring-wheat receives only one furrow, it being feered according to the form of ridge.

What is feering the ground?

Feering is marking out the breadth of ridges with the plough.

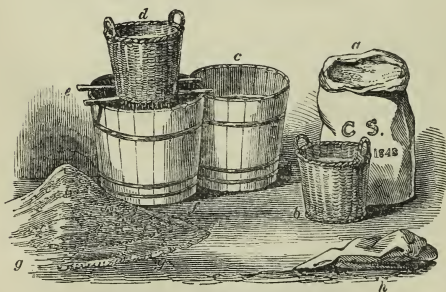
What is the form of ridge usual for spring-wheat?

Commonly single ridges.

Is wheat prepared before being sown in spring?

Wheat is pickled, to prevent the disease of smut attacking it.

Fig. 18.



Apparatus for Pickling Wheat.

a is a sack of wheat to be pickled.

b is the basket into which it is put.

c is the tub of stale urine into which the basket of wheat *b* is dipped, by a person holding it by its two handles.

d is the same basket after it has been dipped, set upon the drainer *e*, placed across the mouth of another tub *f*, to get rid of the superfluous pickle.

g is the heap of pickled wheat.

h are sacks ready to receive the pickled wheat.

Slaked lime in powder is strewn through a riddle over the heap *g*, as it increases in size to the full quantity, when the heap is turned over by two men with shovels several times before the lime can be mixed intimately with the wheat.

As every effective pickle affects the vitality of wheat, none of the pickled wheat should be left unsown over night.

How is wheat pickled ?

The wheat is poured from the sack into baskets, which are dipped in a tub containing stale urine, or a solution of green vitriol, or a strong brine of salt, and then emptied in a heap upon the floor, and dried by means of quicklime strewed over the heap while being turned over with shovels.

How is wheat sown ?

Wheat is sown either by hand or with machines.

How is wheat sown by hand ?

Wheat is sown by hand out of a linen bag, named a sowing-sheet, supported over the left shoulder of the sower, leaving his right arm free. On the sheet being filled with grain by an assistant, its loose part is wrapped round the left arm, leaving the grain exposed for the right hand to grasp. On taking a full handful of grain, the sower throws it forward, in a scattered form, upon the ground, with a full swing of the arm. Some men sow corn with both hands, out of a suitable form of basket suspended in front.

Fig. 19.



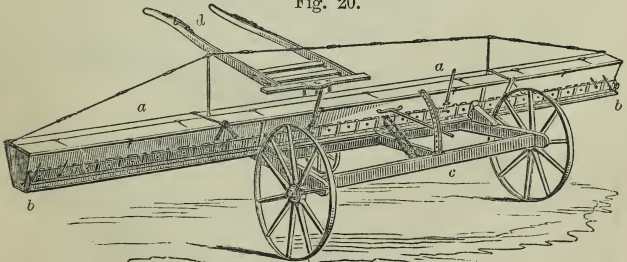
Sowing Corn by Hand.

Who fills the sheet with grain ?

A woman fetches the grain, in a straw rusky, from the sacks, set at proper distances upon the furrow-brows of the ridges across the field.

It is the duty of the seed carrier to supply the sower with seed as he wants it, whether from one or more rows of sacks. It is also her duty to collect the sacks as they are emptied, and to put them out of the way of the harrows.

Fig. 20.



Machine for Sowing Corn Broadcast upon the Ground.

- | | |
|---|--|
| <p><i>a</i> <i>a</i> is the top of a long box, equal in length to the breadth of a ridge.</p> <p><i>b</i> to <i>b</i> is the series of holes out of which the corn issues, and, falling on a board,</p> | <p>is distributed broadcast over the ground.</p> <p><i>c</i> is the lever for stopping and setting agoing the action of the machine.</p> <p><i>d</i> are the shafts for the horse.</p> |
|---|--|

The two ends, *b* and *b*, of this form of the machine hinge over upon the central part, to allow the entire machine to pass through an ordinary gate into a field.

How is wheat sown with machines ?

Machines sow wheat broadcast, drilled, and dibbled.

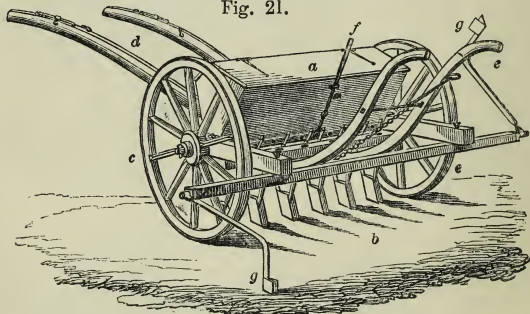
How is wheat sown broadcast with a machine ?

The broadcast sowing-machine consists of a long narrow box, mounted on three wheels, and drawn by one horse, and guided by a man. The seed is pushed out of the box, through holes regulated to a size, to answer the quantity desired to be sown, by means of a long spindle armed with scoops, and set in motion by one of the wheels of the machine. On single ridges the horse walks in the open furrow, and the machine sows two half-ridges at a time. Double ridges are sown with the horse walking along the crown of each ridge.

How is wheat sown in drills with a machine ?

The drill sowing-machine is provided with a large hopper for seed, which supplies a number of spouts enclosed in coulter, which form parallel ruts in the ground for receiving the seed. The hopper and coulters are supported on wheels. The issue of the seed is regulated by a spindle, armed with scoops, set in motion by one of the wheels. The machine is drawn by one horse, and guided by a man. Wheat is sown in drills across the ridges, and the drills are nine inches and upwards apart.

Fig. 21.



'Drill Sowing-Machine.

a is the hopper to contain the seed.

b are the coulters which make ruts in the ground to receive the seed from the hopper by the spouts.

c c are wheels supporting the machine.

d are shafts for the horse.

e are the handles for the conductor of the machine.

f is a lever which regulates the issue of the corn from the hopper.

g g are markers of the breadth of ground occupied by the machine.

Drill sowing-machines are more common in England than in Scotland.

Most of the English drill sowing-machines are complicated, and liable to derangement. The simple form here figured does its work as well as the most complicated and costly.

A woman supplies the seed from sacks placed along the head ridge.

How is wheat dibbled with a machine ?

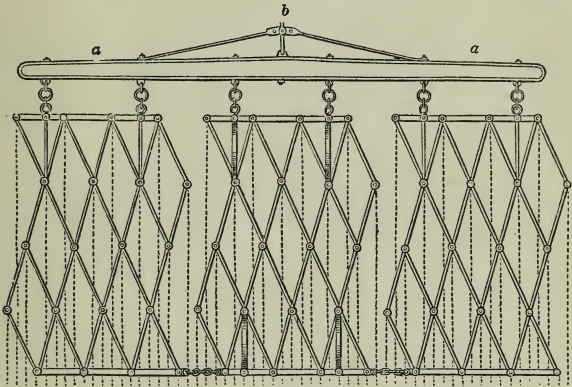
A dibbling machine is worked either by hand, or drawn by one or more horses. The seed, in certain numbers, is pushed through hollow tubes into the ground at stated distances.

Is the ground treated alike prior to being sown with wheat in broadcast, in drills, and dibbled?

The wheat is sown broadcast from the hand, and by the machine, upon the ground as it was left by the plough; and it is covered in with harrows, passed along and across the ridges. Wheat is sown in drills, or dibbled, after the ground has been smoothed by the harrows. The ruts left by the machine are obliterated by a single passage of the harrows along the rows of drills, to preserve the seed in its place.

Harrowing not only smoothes the surface, but also makes the body of the soil into a uniform pulverised bed for the seed.

Fig. 22.



Iron Rhomboidal Harrows.

a a is the long tree to which three harrows are attached, by means of rings and bolts. The harrows are linked together at the bottom with short chains. *b* is the hook by which the harrows are attached to the swing-trees.

The rhomboidal form ruts the surface of the ground with the tines at equal distances.

The most common form of rhomboidal harrows is made of wood.

Is the quantity of wheat sown the same, whether sown in broadcast, drills, and dibbled?

Broadcast sowing requires the most seed, dibbling the least, and drilling a medium quantity. Broadcast-sowing with the machine requires less seed, and scatters it more regularly than broadcast-sowing by hand.

How late in spring may wheat be sown?

Ordinary varieties of wheat may be sown till the latter end of March. Bearded April wheat, and red chaff beardless spring-wheat, may be sown as late as April.

BEANS and PEASE.

When are beans and pease sown in spring?

Beans and pease are sown in February or March.

Are beans and pease sown on every kind of soil ?

Beans succeed best in soils having a large proportion of clay. Beans, with manure, will grow on any soil except peat. Pease are grown on lighter soil than beans.

Do beans always receive manure ?

On clay soils, in good clean condition, beans receive no manure. Beans succeed best on light soils with manure.

How are beans cultivated ?

Beans are cultivated in rows and in broadcast.

How are beans cultivated in rows ?

Beans are cultivated in rows either on drills or on the flat ground.

How are beans cultivated in rows on drills ?

The land that had been ploughed in stubble in winter, is harrowed into a fine state in spring. It is then drilled, about 30 inches apart (*see* p. 6), the seed sown in the hollow of the drills, and covered up by reversing the drills. The crop grows on the top of the drills.

How are beans cultivated in rows on the flat ground ?

The land that had been ploughed in stubble in winter, is ploughed in the common way, and, while being ploughed, the seed is sown in every third furrow. The crop grows on the flat ground.

How is the ground best manured for cultivating beans on drills ?

The manure is taken from a dunghill in carts to the drills. The two wheels of the cart, and the horse's feet, cover three drills.

Fig. 23. After removing the back-board of the cart, a man pulls the manure out of the cart, in motion, with a dung-hawk, in heaps, in the centre hollow of the three drills. One woman, with a small common graip, then divides the heaps of manure into three, one heap in each drill ; and three women follow, one in each drill, and spread the manure along the drills with a drill dung-graip. The seed-beans are then sown in the hollow of the drills, upon the spread manure, by a man pushing a bean-drill barrow before him. The plough then covers the manure, by splitting the drills, and finishes the operation.

The usual mode is to hawk the dung out of the cart for five drills, and three or four women spread the dung in them, as they best can. Where each woman is not confined to her own drill, the spreading of dung is apt to be ill done, and the negligent spreader cannot be detected.

How is the ground manured for cultivating the bean on flat ground ?

The manure is taken from a dunghill in carts, and hawked out in heaps upon single ridges, feered out to be ploughed. The manure is spread over the surface evenly by women, some with small common graips, others with drill dung-graips. The land is then ploughed in the ordinary way, the plough being followed by a woman with a drill dung-graip, to place some of the manure into every third furrow. The bean-drill barrow then sows the seed upon the



A Drill
Dung-
Graip.

ding in the third furrow, which the succeeding plough covers over with a furrow-slice, and finishes the operation. When three ploughs follow one another, the sowing proceeds rapidly by the drill-barrow following the third plough.

A bean-drill barrow is a small machine consisting of a hopper, two handles and one wheel, the motion of which regulates the issue of the seed down a spout.

How are beans cultivated in broadcast ?

In broadcast culture beans are sown by the hand upon the surface of the ground, and covered in with harrows.

Has the bean a peculiar habit of growth ?

The bean requires abundance of air, and carries its grain from bottom to top of the stem, and therefore should be sown thin in the row, and the rows wide apart. When crowded, beans only mature their grain at the upper part of the stem.

Are pease cultivated in the same manner as beans ?

Pease are commonly sown broadcast upon the flat ground ; sown thick, and without manure. Pease are sown, in small proportion, along with beans in rows. Pease are sown with beans, in broadcast, in about equal proportions.

Is there any difference in the treatment of the bean in drills, after sowing, from the flat mode of culture ?

Drills in the making having one side a little higher than the other, the germ of the young bean would grow out of the side of the drill were the drill-tops not lowered down with the harrows before the seed has time to germinate. The flat mode of culture does not require such a harrowing.

TARES.

Of what use are tares ?

Tares supply an excellent green food for live-stock, in summer and autumn.

How are tares cultivated ?

Tares are sown thick, broadcast, on land ploughed into ridges after being manured, and covered in with the harrow, and the surface made smooth with the roller, for the more easy mowing of the crop, when fit for use.

Rollers are made of stone, wood, or cast-iron in the form of a cylinder, Cast-iron is the best material, being heavy ; and if of large diameter, and in two pieces, a cast-iron roller is easily moved and turned round. A framing is required for yoking one or two horses to a roller.

Rolling consolidates light land, and crushes the clods of clay soils.

The surface of rollers are either smooth, ribbed, or jagged.

OATS.

Upon what portion of ground are oats cultivated ?

Oats are sown on ground ploughed from grass, and at times upon land after turnips, instead of spring-wheat or barley.

What use is made of oats ?

Oats supply oatmeal for farm-servants, and corn for horses.

How are oats cultivated ?

Oats are sown broadcast with the hand, or with the machine, or in rows with a drill-machine.

What circumstances determine the sowing of oats in broadcast or in rows?

In the neighbourhood of towns, where weeds abound, oats are sown in rows across the ridges, with a drill-machine, in order to allow cleaning of the ground by means of hand or horse-hoe.

What is the culture after the sowing of the seed?

After broadcast-sown oats, the ground is harrowed along and across the ridges to cover the seed. When oats are sown in rows, the harrows are passed only along the rows to preserve the seed in its place. The roller lastly smoothes the surface.

POTATOES.

How is the culture of potatoes commenced?

The land that had been ploughed in early winter in stubble, is ploughed across the ridges in spring.

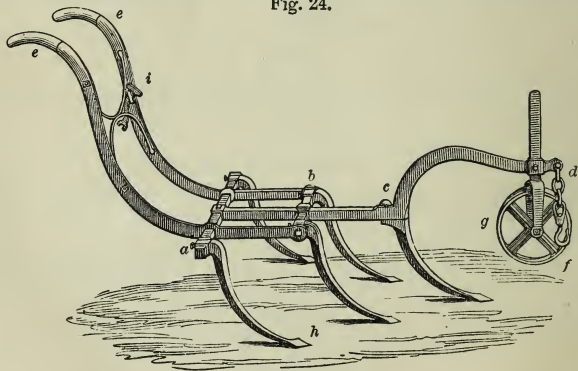
What effect has cross-ploughing?

Cross-ploughing cuts the furrows across which had lain all winter in ridges. Cross-ploughing is executed in feerings of any breadth. Cross-ploughing is a powerful means of pulverising the soil, preparatory to the action of the harrow and roller.

When the soil has been pulverised enough on the surface, what is next done?

The weeds are gathered by hand, and carried away by carts. To preserve the pulverised surface uppermost, the grubber is used

Fig. 24.



Tennant's Grubber.

- | | |
|--|---|
| <i>a b</i> is the iron framing of the grubber. | <i>g</i> is a wheel for regulating the depth of the ground to be grubbed. |
| <i>c d</i> is the beam rising from the frame. | <i>h</i> is one of five tines which grub the ground. |
| <i>e e</i> are the handles for the conductor. | <i>i</i> is the hammer and nut-key for fixing the wheel <i>g</i> in its proper place. |
| <i>f</i> is the hook for attaching the grubber to the swing-trees. | |

Many forms of grubbers have been made all of iron, most requiring four horses to draw them. Tennant's grubber is the most efficient implement of its kind for two horses, and more efficient than some of the four-horse grubbers.

to stir the soil after the cross-ploughing. After the grubbing, the land is drilled up for the reception of the manure, and the manure is put into the drills in the manner described while treating of bean culture in drills in page 24.

Weeds are gathered by women proceeding onwards in a row, and throwing them either in heaps or at once into the cart.

How are potatoes prepared for planting?

A potato is so cut with a sharp knife, that at least two eyes are left in each part for seed.

a a, the rose end, is the best for seed.

b b, *c c*, and *d d* are middle cuts, and if large may each be cut into two sets.

e e, the root end, should not be used for seed, but given to live-stock.

Potato sets should always be large, and if planted whole, the root end should be cut off.

How are sets of potatoes planted?

As the manure is spread in the drills by women (see p. 24), other women plant the sets upon the manure at regular distances from hand-baskets or aprons.

What is the culture succeeding the planting of the sets?

The ploughs cover up the manure and sets together by splitting the drills into new ones.

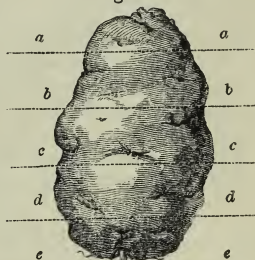
Is potato land always manured in the spring?

Not always. When land is clean, and in good condition, manure for potatoes is spread upon the stubble in autumn, and ploughed in with a deep furrow. Manuring in autumn expedites work in spring.

What sort of soil is best adapted for the potato?

A light, naturally dry, rich soil is best adapted for the potato. The potato is a spring green-crop.

Fig. 25.



A Potato cut into Sets, each having at least two Eyes.

BARLEY.

What use is made of barley?

Barley is chiefly made into malt, for the purpose of brewing malt-liquors, and of distilling spirits.

How is barley cultivated?

Barley is commonly sown after turnips, whether eaten off the ground by sheep, or carried off the land for cattle. Barley is also sown after grass.

How is land treated for barley?

The land for barley, after turnips, always receives two ploughings. The land is feered and ploughed into single or double ridges, and ploughed again the reverse way, or first cross-ploughed and then ploughed into single or double ridges.

Why should barley land always receive two ploughings?

Because barley requires a fine deep loose mould for a seed-bed.

What other means than the plough and the grubber may be used to make a loose mould for barley?

Ribbing with the small plough (see p. 6), when the soil is fine above and raw underneath, makes a good seed-bed for barley.

How is barley sown?

Barley is sown broadcast by hand or by machine. Barley is sown in rows with a drill-machine. Barley is sown in rows in ribs broadcast by hand.

What is the culture after the sowing of the seed?

After sowing follows harrowing. In broadcast-sown barley, the land receives harrowing along and across. After drilling or ribbing barley, the harrowing is only along the rows, to preserve the seed in its place.

What follows the harrowing?

Grass-seeds are then sown upon the land, and harrowed in with light harrows. The roller lastly makes the surface smooth.

GRASS-SEEDS.

What are grass-seeds?

The seeds which produce grass, consist of those of true grasses, and of clovers.

Which grass-seeds are commonly in use?

Of true grasses, only one kind is used, namely, rye-grass, of which there are two varieties—an annual, and a perennial. Of clovers, two kinds are used—red and white.

How are grass-seeds used?

Rye-grass and clover seeds are mixed, and sown together.

In what proportions are rye-grass and clover seeds used?

One bushel of rye-grass seed is sown on the acre. Clover seeds are proportioned to the nature of the soil and the number of years the grass is to remain.

How are mixed grass-seeds sown?

Grass-seeds are sown broadcast, with the broadcast sowing-machine (fig. 20, p. 21.)

When are grass-seeds sown?

Grass-seeds are always sown in spring, along with grain crops that follow green crops.

What is the culture after sowing grass-seeds?

Grass-seeds are covered with light harrows, having short tines. The roller lastly smoothes the surface.

TURNING DUNGHILLS.

How are the dunghills, formed in winter, treated in spring?

The dunghills for manuring potato and turnip land are turned for fermentation in spring, just before being used for the crop.

Manure fermenting under cover requires no turning. Tramped-on manure in courts and hammels requires turning.

How are dunghills turned over ?

A narrow trench is cut by a man, with the dung-spade, across the dunghill. The cutting is executed by holding the handle of the spade in both hands, and thrusting the point of its sharp double-edged blade with force into the dung, cutting it both right and left. The breadth of manure thus cut across is shaken up with graips by men or women, so as to make a clear trench to the ground. Another breadth of the manure is then cut across with the dung-spade, and turned and shaken with the graips upon the ground of the cleared trench, and where it stands higher than the compressed manure. Trench after trench is thus made until the whole of the dunghill is turned.

What immediate effect has turning upon manure ?

Turning immediately excites fermentation in manure. Fermentation gives manure short texture and uniform quality. Warm air sensibly promotes fermentation in dunghills. Hence the time for turning dunghills to be used should be regulated by the heat of the weather.

CALVING of COWS.

In what state are live-stock in spring ?

In spring, live-stock bring forth their young.

Which kind of live-stock produce their young earliest in spring ?

The cows are the first to produce their calves in spring.

What symptoms do cows exhibit of calving ?

The principal symptom is the filling of the udder with milk.

Do cows require assistance in calving ?

Cows calve the more easily with assistance.

How is the calf treated after birth ?

The calf is immediately taken away from the cow, and put by itself into a crib of clean straw.

How is the cow treated after calving ?

The cow receives a drink of lukewarm water and oatmeal after calving. Shortly after receiving the drink, the milk is drawn from the udder of the cow.

How is milk drawn from the udder of the cow ?

Milk is drawn from the cow by stripping each teat between the fore-finger and thumb, or by grasping each teat with the whole hand, which is the better method for the cow.

REARING of CALVES.

How are calves reared ?

Calves are reared by hand, or by sucking their mothers.

How are calves reared by hand ?

Milk, warm from the cow, is put into a small pail with one

handle, and the mouth of the calf is led into the milk, by a hand of the person who feeds it.

How many times a-day should a calf be fed ?

A young calf, whilst young, should have milk from the cow three times a-day, in small quantity, which is increased as the calf attains age.

Do calves on milk receive other kinds of food ?

Hay and sliced turnips are placed before calves in their cribs.

How long are calves supported upon milk ?

Calves have milk until three months old, after which it is gradually lessened in quantity, and other food increased, until weaned. Oilcake is good for calves.

When are calves put to grass ?

Calves are put to grass whenever it is ready to receive them in mild weather.

How are calves reared when sucking their mothers ?

Before grass time, calves are taken from their cribs to the cows to receive milk at stated times a day. When at grass, calves remain with the cows constantly until weaned.

Who takes charge of calves ?

The dairymaid takes charge of calves.

LAMBING of EWES.

What particular treatment do ewes in lamb receive previous to lambing ?

Ewes about to lamb are put into a small field near the stead-ing, that the shepherd may observe symptoms of lambing as they appear.

Do ewes require assistance in lambing ?

Leicester ewes require assistance in lambing, but the more hardy races do not.

What treatment does the ewe receive in lambing ?

The ewe remains in the paddock for some days after lambing, and receives nourishing food, as cabbages, turnips, oilcake, and corn if weak, until she has plenty of milk, and the lambs are able to suck and follow her, when both are put on new grass.

Are ewes subject to any complaint after lambing ?

Ewes are at times seized with milk-fever after lambing.

In case of a ewe dying, what is done with her lamb or lambs ?

Lambs that have lost their mothers are put to ewes that have lost their lambs, or have single lambs.

When there is no ewe to take a lamb, what is done with it ?

The orphan lamb is brought up by hand by the dairymaid upon warm cow's milk.

FARROWING of SOWS.

When do sows bring forth their young ?

Not earlier than spring, as winter is too cold a season for young pigs.

How are sows treated prior to the period of farrowing ?

Sows are allowed to go at large until symptoms of farrowing appear upon them, when they are put into a roomy sty, under cover, and easy of access.

Do sows require assistance in farrowing ?

No : sows bring forth their young easily. Sows, being apt to become sick after farrowing, should be attended to at that period. Litter given at farrowing to sows should be scanty and short, in case they lie down upon and smother their young.

Should sows receive food soon after farrowing ?

Food is given to sows whenever they are on foot after farrowing.

What sort of food is best for sows after farrowing ?

A gruel of oat or barley meal, with warm water, is the best drink for sows after farrowing. While suckling pigs, sows should receive abundance of the most nourishing food.

How old are pigs when weaned ?

Pigs remain with the sow until two months old.

HATCHING of POULTRY.

Which poultry first lay their eggs in spring ?

Ducks are the earliest layers of eggs—then fowls, then geese, and lastly turkeys.

What is the natural habit of poultry when laying their eggs ?

All kinds of poultry desire to make a nest, to lay a certain number of eggs in it, and to sit upon them, to produce young.

Are poultry indulged in their natural desire to produce young ?

Not all poultry. Eggs are taken from hens and ducks as soon as laid, and they continue to lay more than they desire for hatching. Geese and turkeys are allowed to hatch the eggs they lay.

How are eggs treated on being gathered ?

If not sold at once, eggs are placed singly upon a wooden shelf, and turned over on the opposite side every day.

Are nests provided for poultry ?

Hatching-nests are made upon the floor of the hen-house, to enable young birds to leave their nests. Poultry are separated from each other while hatching their eggs.

How are chicks of the common fowl treated when just hatched ?

Chicks have crumbs of bread and oatmeal to eat, and water in a flat dish to drink, for a time ; then rice, groats, pearl-barley, until they are able to eat the food given to the hen. Hens have boiled potatoes and oatmeal-porridge to eat, and water to drink.

How soon can chickens provide for themselves ?

Chickens go six weeks with the hen.

How are young turkeys treated ?

Young poults have hard-boiled egg—the yoke and white being minced very small—to eat, and milk to drink, for a fortnight. When a fortnight old, they have small pieces of hard oat-meal-porridge, with hard-boiled egg, to eat, and milk to drink. When the feathers of the tail and wings begin to sprout, the hard-boiled egg is withdrawn, and the hard oatmeal-porridge, with bits of fresh-minced meat, given. The turkey-hen has boiled potatoes, oatmeal-porridge, and corn to eat, and water to drink.

How are goslings treated ?

Goslings are fed on grass, in a warm sheltered situation. Geese eat grass with the goslings.

How are ducklings treated ?

Ducklings are kept from swimming in water for some days. Ducklings have always soft food, such as oatmeal-porridge, boiled potatoes, bread steeped in water, barley-meal brose, to eat, and water to drink. The duck receives the same food.

Are young poultry easily affected by the weather or accidents ?

All young poultry are taken under cover whenever rain falls. Until feathers cover the body, rain is injurious to young poultry. Goslings are apt to fall on their back, and soon die, if not again set on foot. When ducklings swim too soon, they become benumbed and die.

What are the great principles to be attended to in the rearing of young poultry ?

Attention to warmth and dryness, with a regular supply of good food daily, for at least the first fortnight of their existence, are essentially requisite in the rearing of poultry. Care will be crowned with success, while neglect will entail disappointment and loss. New-hatched poultry should be put into a warm chamber every night until they are covered with feathers.

Who takes charge of poultry ?

The dairymaid or domestic servant takes charge of poultry. In a large establishment of poultry a person is specially appointed to rear them.

SUMMER.

What is the nature of farm culture in summer ?

Farm culture in summer consists of keeping the land under every species of crop free of weeds ; of sowing green crops, for consumption in a future season ; and of promoting the growth of live-stock, by pasturage and soiling.

What crops are weeded in summer ?

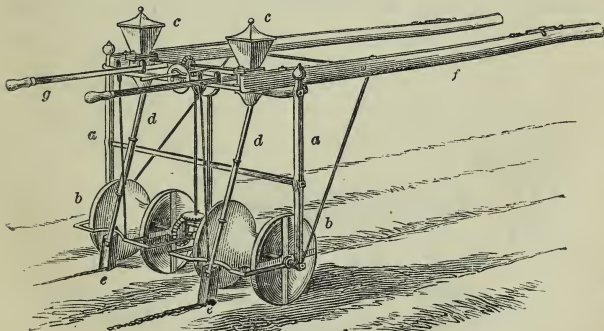
The grain crops sown in spring—wheat, barley, and oats ; and the green crops raised in summer—turnips, mangold-wurzel, hay, clover, Italian rye-grass, rape.

TURNIP CULTURE.

How is the turnip cultivated ?

The stubble land is ploughed in winter ; it is cross-ploughed in spring ; and in summer it is cleaned and pulverised as finely as possible before the turnip-seed is sown. After cleaning and pulverisation, the land is drilled up and manured as described for beans at p. 24.

Fig. 26.



A Turnip - Sowing Machine.

a a is the framework.
b b are two cast-iron rollers revolving on an axle, fitted to lap over two drills.
c c are two canisters for seed.
d d are spouts down which the seed de-

scends into the ruts made by the coul-ters *e e*.
f are shafts for the horse.
g are handles by which a man guides the machine.

A small lever between the handles *g* puts the gearing out of and into action.

There are great varieties of form of turnip-sowing machines. This is one of the simplest and least costly.

How is turnip-seed sown?

Turnip-seed is sown by means of a turnip-sowing machine, which moves upon its rollers along two drills, on the tops of which the coulter make ruts which receive the seed from the canisters by the spouts. One horse draws, and one man guides the machine.

With what manure are turnips raised?

Turnips are commonly raised with farmyard manure, assisted with guano. Turnips are raised with guano alone. Turnips are raised with bone-dust alone, or with it and guano.

When guano is used with farmyard manure, how is it applied to the land?

Guano is sown by hand, no machine having yet been invented for depositing it. Guano is sown upon the spread farmyard manure. The plough, on splitting the drills, covers both the manure and guano.

How is guano used alone for turnips?

Guano is sown upon the land before the drills are made, and in their making, the guano falls into the centre of each drill.

How is bone-dust manure used for turnips?

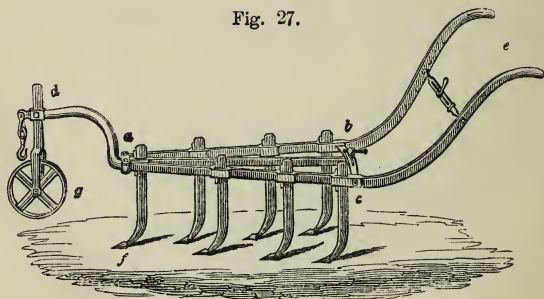
Bone-dust is deposited in the drill, along with the seed, by means of a bone-dust-sowing machine.

A bone-dust-sowing machine is a common turnip-sowing machine mounted with two hoppers for the bone-dust, at the bottom of which revolve toothed wheels which serve out the bone-dust regularly.

How are bone-dust and guano used together in raising turnips?

Guano is first sown before the drills are made, and then the bone-dust is sown by the machine—the guano supplying ammonia; the bone-dust phosphates.

Fig. 27.

**Drill Grubber for scuffing Turnip and Potato Drills.**

a b c the frame.

a d the beam.

e the handles.

f the tines, of which there are seven, with flattened shares at their points.

g the wheel for regulating the depth of soil stirred.

The wings *b a* and *c a* expand to suit the breadth of drills.

There are many forms of scufflers.

Drill-harrows are used for the same work, but are not so efficient.

What is the treatment of the young turnip-plant ?

After the young turnip-plants have braired and produced four leaves, the ground between them is scuffled, and they are singled.

How does the scuffler act ?

With its shares the scuffler thoroughly cuts down the weeds between the rows of turnips, while the outermost ones pare away the sides of the drills to facilitate the singling of the turnip plants.

Fig. 28.



Singling Turnip-Plants.

a is one row of turnip plants ; and
b is a second, both to be singled by the same woman.
c is a third row ; and
d is a fourth, both to be singled by the same woman.

e is a fifth row ; and
f is a sixth, both to be singled by the same woman.
g is the last row singled in the division of the drills formerly occupied by the women.

Men and boys are usually employed in England to single and hoe turnips. Women are employed in Scotland.

Boys and girls should learn to single turnips, but they should not be solely intrusted to do so important a work.

How is the singling of turnip plants executed ?

Singling of turnip plants is done with the hand-hoe by women, who each take two drills, to give themselves room to use the hoe. The hoe removes all the plants against which the length of its blade is shoved from and drawn towards the worker, one plant being left growing. The distance between the growing plants is determined by the kind of turnip cultivated,—the smallest distance being between white turnips, and the greatest between swedes.

In England and Ireland, turnips are not unfrequently singled with the hand. It is an expensive method.

Hoes with short shanks are more convenient and certain in singling turnips than with long shanks, though more severe on the labourer.

Singled-out plants of swedes may be transplanted to fill up gaps.

What is done after the turnips are singled ?

After singling, the scuffler removes simply the weeds between the plants, without paring the drills. The ground between the plants is then moved with the hand-hoe, the weeds destroyed, and double plants singled by hand. When the soil is dry, hoeing finishes the culture of the turnip. When the soil is clay, the double-mould-board plough lays the earth towards the plants, leaving a furrow at the bottom of the drills for water to run off.

What is the soil best suited to the turnip?

A deep loamy soil, resting upon a naturally dry subsoil, is the best soil for the turnip.

What is the character of the bulbs of the white globe, swede, and yellow bullock turnips?

The swede is the heaviest in specific gravity, is of buff colour, and the larger the bulb, it is the more nutrient. The white globe is open in texture and juicy, is of white colour, and when large becomes hollow in the heart. The yellow bullock bears a medium character between the swede and white globe, as to nutriment and specific gravity, and is of orange colour.

MANGOLD-WURZEL.

What is the nature of mangold-wurzel?

Mangold-wurzel is a species of beet well known in Germany.

How is mangold-wurzel cultivated?

Mangold-wurzel is cultivated like the turnip, except that its seed, having a rough covering, is sown by hand.

Plants of mangold-wurzel bear transplanting as well as swedes.

HAY.

What crop is made into hay?

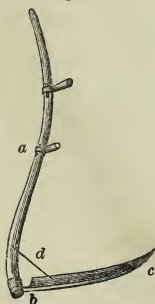
The grass produced from the grass-seeds, sown among the grain-crops of the former year (page 28), is made into hay in summer.

Are no other plants but rye-grass and clover made into hay?

Old meadow-grass is made into hay.

Most of the hay used in England and Ireland is made of old meadow-grass. But little of the hay used in Scotland is made of old meadow-grass.

Fig. 29.



The common
Scythe.

What is the nature of hay?

Hay is rye-grass, clovers, and old meadow-grasses deprived of their natural moisture by the heat of the atmosphere, when mown in the prime of their growth.

How is grass mown for hay?

Grass is mown for hay with a scythe.

a is the sned for the right hand of the mower.

b c is the blade.

d is the grass-nail, a stay for resisting the strain upon the blade *b c*.

In setting the blade of a scythe, the handle from *a* to *b*, the blade *b c*, and the distance from the point *c* to the handle *a*, should form an equilateral triangle.

The scythe lays the mown grass into swathes.

The scythe is kept sharp with soft sandstone. Its edge is smoothed with a strike.

How is grass treated after being mown?

Grass is tedded or shaken up to be dried.

Grass is best and most quickly tedded by a hay-tedding machine. Each day's mowing is tedded in succession.

Tedding-machines are too little used in Scotland. The English ones are complicated and costly, but they do their work well.

How is tedded grass treated ?

Tedded grass, after exposure to the air, is put into small cocks, by hand or with small forks. The ground is cleared with a hand-rake.

The horse hay-rake is a quick and efficient machine.

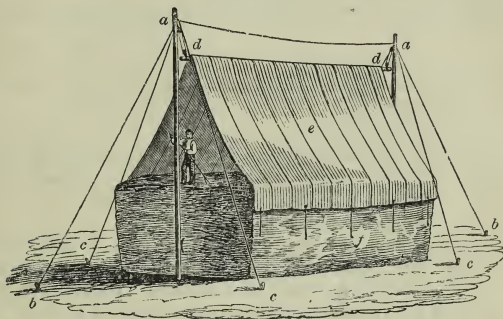
What is done with the small cocks of grass ?

In fine weather the cocks are spread upon the ridge on which they stand, to dry the grass still more. The grass is then put into larger cocks. The ground is cleared with the hand-rake.

What is done with the larger cocks ?

If necessary, the larger cocks are spread out to the air. The grass on being changed into hay is carried in carts to the stack.

Fig. 30.

**A Rick-cloth set for a Hay-stack.**

- a a* are two poles set on end at a distance of the length of the rick-cloth. and hoisted up and lowered down by means of block and tackle.
b c are guy-ropes supporting the poles *a*. *e* is the rick-cloth.
d d is a spar supporting the rick-cloth, *f* are reef points for fastening the rick-cloth to the stack.

The hay is brought in small quantity every day from the field, in a cart, and spread thinly over the stack under the rick-cloth, where it dries in the draught of air. When the stack is finished the rick-cloth is removed, and the stack is covered with straw, held down with straw ropes.

How is hay stacked ?

Hay is best stacked under cover of a rick-cloth, which protects the stack from rain.

Rick-cloths are much used in England, and too little used in Scotland.

Does a hay-stack, protected by a rick-cloth, incur any danger ?

Yes. Hay incurs the risk of heating by fermentation, when the moisture has not been sufficiently dried out of the grass.

Does heating injure hay ?

A little heating improves the taste of hay. Much heating gives hay a bitter taste, and moulds and rots it.

Is the hay-stack finished under the rick-cloth ?

No. After the removal of the rick-cloth, the stack is covered

with straw, kept down with straw ropes, to protect it from the weather.

Is the mode just described the common mode of making hay?

It is the common mode of making hay in England and Ireland, but not in Scotland. In the former countries hay is much better made than in the latter, where the mown grass is too long exposed to the weather.

How is hay used from the stack?

Hay is cut in narrow breadths across the stack with a hay-knife, and carried into the hay-house for use.

A hay-knife has a broad blade with one sharp edge and a cross handle.

RAPE, ITALIAN RYE-GRASS, RED CLOVER.

What is the nature of the rape plant?

The rape plant is of the cabbage tribe, and is cultivated for its leaves.

How is rape cultivated?

Rape is cultivated like the turnip. Rape is also sown broadcast on the flat ground.

What use is made of rape?

Rape is much relished by sheep and cows. Sheep eat rape on the ground. Cows receive rape in the byre. Rape is valuable food for ewes before receiving the tup in autumn.

How is Italian rye-grass best cultivated?

Italian rye-grass, growing rapidly and tall, is best cultivated broadcast by itself, with manure, as a forage-plant. Italian rye-grass affords several cuttings in a season. Italian rye-grass is much relished by live-stock, either in pasture or in soiling. Italian rye-grass thrives well under irrigation.

Is red clover a good forage-plant?

Red clover is an excellent forage-plant when sown by itself, as is done in England and Ireland. Red clover makes the best hay for ewes in winter, when the ground is covered with snow.

How are forage-plants best secured?

Tares are best cut with the sickle, being apt to entangle the scythe. Rape is too strong for the scythe, and is cut with the sickle. Rye-grasses and clovers are best mown with the scythe.

WEEDING GRAIN and GREEN CROPS.

How are grain-crops weeded in summer?

From wheat, barley, and oats, in drills and ribs, the hand-hoe and horse-hoe remove the weeds.

Horse-hoes are complicated and costly machines. The hand-hoe may be seen in fig. 23, p. 35.

How are grain-crops sown broadcast weeded?

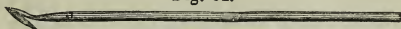
Broadcast grain-crops are weeded with a weed-hook.

How is a weed-hook used?

Two women walking among the growing corn, when knee-

deep, along every ridge, cut every weed close to the ground with a weed-hook. Weeds among growing corn are chiefly thistles and docks. Popple, found amongst wheat, is pulled up by the roots.

Fig. 31.

**A Weed - Hook.**

Of what use is weeding to grain crops ?

Weeding removes the seeds of weeds that would otherwise mix with grain in the sample.

Are weeds removed from green crops in summer ?

In summer the scuffler removes weeds from potatoes, turnips, mangold-wurzel, rape. The hand-hoe best destroys thistles, rag-weed, nettles, when young, from pasture ; when old, the scythe is used to cut them down.

Is grass for hay ever weeded ?

Grass for hay is weeded with the weed-hook.

PASTURING and SOILING LIVE-STOCK.

How are cattle, sheep, and horses treated in summer ?

When winter food—turnips, straw, and hay—is exhausted, live-stock are put to pasture on grass, or are soiled at the steading on forage-plants.

What is pasturing on grass ?

Pasturing on grass is giving liberty to animals to eat grass in the fields as it grows.

What grass is pastured ?

Permanent and sown grasses are pastured. The older sown grasses are pastured. The younger-sown grasses are mown for soiling or for hay.

What classes of cattle are pastured ?

Cows, calves, and young cattle, are pastured.

Do cattle on pasture remain out day and night ?

Until the nights become warm, cows and calves are brought into the house at night. Young cattle remain out all night on pasture.

What pastures do sheep occupy ?

Ewes and lambs pasture young grass. Fattening sheep pasture on the best old grass.

Are horses pastured ?

Young horses remain out all night at pasture. Work-horses are pastured as soon as turnip-sowing or bare-fallowing is brought to a close. Except for a few weeks of warm nights, work-horses are kept in the stable or hammels at night.

What is soiling live-stock ?

Soiling consists in giving green forage-plants to live-stock at the steading.

What classes of live-stock are soiled ?

Work-horses are soiled in the stable or hammels. In cold or wet seasons, cows are soiled in the byre.

Is abundance of forage-plants and straw secured every summer ?

No. In dry-land districts straw is always scanty. In most seasons only one good mowing of clover is obtained. Tares and rape can only be mown once.

Of what use is the grass, after hay has been carried from the field ?

Aftermath or eddish is pastured by young cattle, calves, cows, and fattening sheep.

Is aftermath valuable grass ?

Aftermath is valuable for producing good butter and cheese.

Is water essential to live-stock on pasture ?

Water is a necessary for live-stock on pasture, or on forage.

MARES FOALING.

What is the treatment of mares when about to produce their young ?

A mare is worked till symptoms of foaling appear, when she is put by herself into a loose-box or out-house.

Do mares require assistance in foaling ?

Mares foal very easily, without assistance.

Is the foal in danger when being foaled ?

The foal may be smothered in the placenta of the mare when being foaled. In the exertion to rise to its feet the foal may exhaust itself to death. Hence a mare should be waited upon at foaling.

What is the treatment of the foal immediately after birth ?

The foal's nose should be freed of any obstruction to breathing. After a little time the foal is assisted to its feet, and to the teat of the mare.

How is the mare treated after foaling ?

After receiving nourishing food for some hours—such as warm mashies of boiled carrots and barley, and drinks of lukewarm water and oatmeal, the mare is put to grass, with her foal, for the season.

Are mares worked while suckling their foals ?

Some farmers work mares while suckling their foals, in which case both the mare and foal ought to have corn.

WASHING and SHEARING SHEEP.

How is the fleece on the sheep treated ?

Sheep are washed in river water, to make their fleece clean before being shorn.

Are sheep prepared for being washed ?

Sheep are enclosed, by net or hurdles, on one side of a pool

made in a rivulet. Until all have been washed, sheep are confined in a similar manner on the other side of the pool.

Fig. 32.



Sheep-Washing.

a is the washing-pool, formed by damming the water of a rivulet.

b are sheep enclosed preparatory to being washed.

c is the first man who receives each sheep

from a man and washes it, and then hands it to the second man, and he hands it to the shepherd.

d are the washed sheep.

e are provisions.

Both banks of the pool should be grassy, to keep the fleece clean.

How are sheep washed in a pool ?

One man seizes a sheep within the enclosure, and hands it to another man standing to the haunches in the pool. This man turns the sheep on its back in the water, keeping its head above it, and pushes it to and from him through the water, after which he hands it to another man standing in the middle of the pool, who, operating in a similar manner, hands it to the shepherd, who, on particularly examining whether the fleece be sufficiently clean, allows the sheep to swim out of the pool to the enclosure on the grass-bank nearest him.

Are ewes and lambs washed together ?

Lambs are not washed at all, and are confined in the steading until the ewes have been washed.

How are sheep treated after being washed ?

Washed sheep are put into a clean grass-field until ready to be shorn.

What is the state of a fleece ready to be shorn ?

A fleece is ready to be shorn when its natural grease, or yolk, completely pervades the staple of the wool, and when it is quite dry.

Of what use is yolk to the wool ?

Yolk serves to keep the wool smooth and supple, in which state it is best suited to the manufacturer.

By what means is the fleece shorn from the sheep?

The fleece is shorn from sheep by hand, with shears.

How is shearing of the fleece performed?

Sheep to be shorn are put in with the wool dry under cover. A canvass is spread upon the ground under cover. The shearer seizes a sheep, and setting it against himself on its rump, removes the wool about the head, neck, and belly. Turning the sheep on its right side, the shearer clips the wool from the belly to the back-bone of the left side. Turning the sheep upon its left side, the shearer clips the wool from the back-bone to the belly of the right side. On the shearing being finished, the sheep is allowed to join its companions under cover.

What is done with the shorn fleece?

A woman rolls up the fleece, with its outside in, upon a board, and carries it to the wool-room.

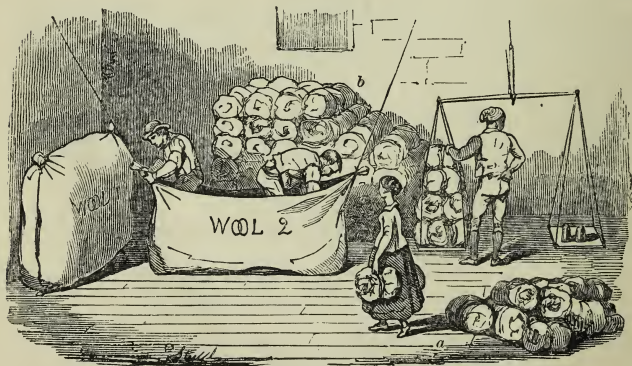
Are all kinds of sheep washed and shorn in the manner described?

Mountain sheep are washed by being swum through a pool. The fleece of mountain sheep is shorn by the shearer clipping the wool in any direction he may choose to use the shears, generally along instead of round the body of the sheep.

How is wool disposed of?

Wool is sold to a wool-dealer. A wool-dealer sends his people with pack-sheets to pack the fleeces into, and take them away. Some farmers pack the fleeces into pack-sheets of their own, and send the packs of wool to a wool-dealer.

Fig. 33.



Wool-Packing.

No. 1 is a wool-pack completed; No. 2 is a wool-pack being filled; *a* are fleeces which have been weighed, and are being conveyed by the girl to be packed; *b* is the store of fleeces to be weighed in the balance.

Fleeces are weighed in double stones. Stones of wool vary in weight in different parts of the country. In England a stone of wool is 14 lb., in Scotland 24 lb.

How are fleeces packed in a pack-sheet?

Fleeces are first weighed on scales, in double stones. The pack-sheet is suspended from the roof with ropes from two of its corners, and with its open side uppermost. Two men go into the pack-sheet, and on receiving the fleeces, place them in regular order in the sheet, and tramp them down firmly with their feet until the sheet is full, when its open side is sewed close with pack-thread and needle.

On weaning lambs from ewes, what is done with both?

Ewes are milked by hand for a few times in the course of a week or two, to allow the milk to dry up. Lambs are placed at a distance from the ewes until they cease to bleat.

DISEASES of GRAIN and GREEN CROPS.*Are grain and green crops subject to disease?*

All cultivated crops are subject to disease.

What diseases attack wheat?

Wheat is subject to the attack of the wheat-fly, whose young eat the grain in the ear. Wheat is subject to smut, a fungus which displaces the grain by balls of black powder. Leaves of wheat are covered by rust, another fungus, like red-coloured dust.

What diseases attack barley?

Barley is subject to ergot, which protrudes from the grain. The young grain of barley in the ear is devoured by an insect.

What diseases attack oats?

Oats are subject to segging, which stints the leaves, and hardens the roots. Oats are attacked by a fungus, which gives blackened ears for grain.

What diseases attack rye?

Rye is attacked by ergot.

What diseases attack beans?

Plant-lice devour the leaves of beans.

Is the turnip subject to disease?

A flea-beetle consumes the leaves of the young turnip-plant. In dry weather, leaves of turnips are subject to mildew. Finger-and-toe distorts the bulbs of turnips. Anbury is a warty sore on the bulbs of turnips, which discharges ichor.

Is the potato subject to disease?

Curl attacks the potato. Potato-failure blackens the leaves, and blotches the tubers of the potato-plant.

What remedies have been suggested for diseases in crops?

Pickling prevents smut in wheat. Lime prevents the finger-and-toe and anbury in turnip. Rain removes flea-beetles and mildew from the leaves of turnips. No remedy has yet been found against the plant-louse on the bean, the ergot in rye and barley, the black ears in oats, and the failure in the potato.

A U T U M N.

What is the nature of farm culture in autumn ?

In autumn, butter and cheese are made, grain-crops reaped, live-stock disposed of, and also purchased for the ensuing year.

MAKING BUTTER and CHEESE.

What is the accommodation required for making butter and cheese ?

Cool, shaded, dry rooms in the farmhouse keep milk sweet, and cheese in a proper state until fit for market.

What are the utensils for making butter ?

Utensils for butter-making are, a sieve for straining the milk, milk-dishes, a churn for making the butter, a cream-skimmer, a cream-jar, and a small tub for washing the butter in.

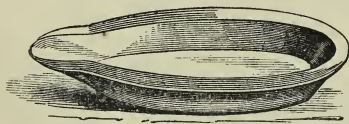
What sort of sieve strains milk ?

A hollow wooden basin with pierced zinc in the bottom.

Why is milk strained through a sieve ?

Straining milk takes out hairs and other impurities from it.

Fig. 34.



A Milk-dish of Wedgwood ware.

Of what construction are milk-dishes ?

Milk-dishes are of various forms, and of different materials. Milk-dishes are round, oval, dished, and shallow. Milk-dishes are of stoneware, china, glass, wood, zinc, slate, and marble.

Broad and shallow milk-dishes cause the cream to come most quickly to the top of the milk. Milk-dishes are best of Wedgwood ware, because strong, and easily kept clean.

What is a cream-skimmer ?

A thin-edged hollow dish of china or tin best takes the cream off milk.

What is a cream-jar ?

A glazed jar ; holds cream until churned into butter.

Why is cream skimmed from milk ?

Cream is skimmed off milk to be made into butter.

Is not butter obtained from milk ?

Butter may be made from milk.

Why is not all butter made from milk?

Because butter is most easily made by hand from cream. Power is required to make butter from milk.

What is the best construction of churn to make butter in?

The old plunge-churn, and the box-churn, are both simple in construction and efficient in use.

What is the plunge-churn?

A plunge-churn is an upright cylinder of wood, with a flat plunger, perforated with holes, to fit its interior.

a is the body of the churn.

b the shaft of the plunger, which is not seen in the figure.

c the cover of the churn, having a raised cup upon it, through which the shaft of the plunger works.

The motion for a plunge-churn is vertical. It may be moved by hand or power.

Of what form is the box-churn?

A box-churn consists of an oblong box, in which revolves an agitator with cross-bars upon a spindle worked by a winch-handle.

a is the body of the box churn.

b is the winch-handle which turns the fans which are not seen in the figure.

The fans of a box-churn have a vertically rotatory motion.

There is a great variety of forms of churns, but all are worked by a vertical or a rotatory motion.

Is sweet cream or sweet milk churned into butter?

No. Cream and milk are kept till they become sour to make butter.

Is cream or milk churned cold or warm?

The best temperature for milk or cream to be churned into good butter is 56° Fahrenheit.

What is done with new-churned butter?

New-churned butter is taken from the churn and washed clean of the butter-milk, which is sour, in cold water, and made into rolls, or ornamental prints, for use as fresh butter.

Is all butter eaten fresh?

Salted butter is eaten in winter.

Fresh butter is eaten in Scotland in summer. Fresh butter is rarely met with in England or Ireland.

How is butter salted?

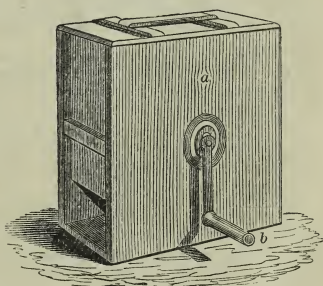
On butter being washed clean in cold water, in a shallow tub, a certain proportion of salt is worked by hand equally through it.

Fig. 35.



A Plunge-Churn.

Fig. 36.



A Box-Churn.

Salted butter is packed firmly in jars or wooden kits, for use in winter.

Of what use is milk deprived of its cream ?

Skim-milk is used for domestic purposes. Skim-milk is not so nutritious as sweet-milk.

Of what use is butter-milk ?

Butter-milk is used for domestic purposes, or given to pigs.

From what is cheese made ?

Cheese is made from sweet-milk, and from skim-milk.

What are the utensils required in cheese-making ?

Utensils used in cheese-making are a large tub, a curd-cutter, a drainer, cheese-vats, cheese-press, and boiler.

What is a curd-cutter ?

A curd-cutter consists of an oval or round hoop of iron divided along the middle by a straight slip of iron. The iron hoop has an iron stem, furnished at top with a wooden cross-handle.

What is a cheese-drainer ?

A cheese-drainer is made of two small bars connected with two cross-bars of wood. A cheese-drainer lies across the mouth of a tub to support the curd while the whey is squeezed out of it.

What is a cheese-vat or chessart ?

A cheese-vat consists of a strong tub of wood hooped with iron, of a form determined by that of the cheese to be made.

What is a cheese-press ?

The best construction of cheese-press is of combined levers, which press upon the cheese as it shrinks in the cheese-vat.

What is a boiler ?

A boiler is of cast-iron, semi-globular, and built over a furnace provided with a damper.

How is cheese made ?

Milk is put into a large tub, part of which is heated in the boiler, to make the whole as warm as new milk. Rennet is put into the warm milk to convert it into curd.

What is rennet ?

Rennet is the stomach of a calf, pig, or lamb, salted and dried.

What is curd ?

Curd is the coagulated part of milk, having a white colour.

What is done with curd ?

Curd is cut into pieces in a tub with the curd-cutter. As curd is cut, whey flows out.

What is whey ?

Whey is the watery part of milk, and is of a yellow colour.

What is done with curd after its separation from whey ?

Whey is removed from curd with a hollow dish, pressed firmly by the hands. The comparatively dry curd is then put into a cloth of open texture, and placed upon the drainer on a tub,

and whey is pressed out of it by mechanical means. The curd is then dry, of a pure white colour, and firm in texture.

What is done with dry curd ?

Dry curd is cut small with a knife, or curd-breaker, and then salted.

A curd-breaker consists of two cylinders, of wood or iron, armed with pegs, revolving in opposite motions, at the bottom of a hopper. The cylinders take in the curd from the hopper, while the pegs tear it into very small pieces.

What is done with salted curd ?

Salted curd is wrapped in a cloth and put into a cheese-vat, under a cover of wood, and placed upon the sill-plate of the cheese-press, which, with great pressure, forces all the whey out of it. By repeated pressing and changing of cheese-cloths, curd is hardened into cheese.

What is done with cheese ?

Cheese, on being taken from the vat, and out of its cloth, is placed upon a clean shelf of wood in a cool, airy cheese-room. Cheese is turned every day, until ready for market.

What is done with whey ?

Whey is given to pigs to drink.

DISPOSAL of LIVE-STOCK.

When are cattle and sheep, fattened in winter and spring, sold ?

Cattle and sheep are sold whenever the turnips are consumed, in the beginning of summer.

When are cattle and sheep, fattened in summer and autumn, sold ?

Cattle and sheep, fattened in summer and autumn, are sold when the grass fails.

Are young cattle and young sheep sold ?

Young cattle from grass are either sold, or fattened on turnips in winter. Young sheep are either sold, or have turnips in winter. Lambs, when reared for fat lambs, are sold in summer as soon as they are fat. Lambs, when sold lean, are sold as soon as they are weaned.

PROPERTIES of LIVE-STOCK for BREEDING from.

How are cattle and sheep, to be bred from, selected ?

Individual animals, possessing properties most desirable in live-stock, are kept, the others drafted.

What are the most desirable properties in live-stock for breeding ?

Desirable properties in live-stock are pure blood, beauty of symmetry, and disposition towards fatness and milk.

What is pure blood ?

Pure blood is freedom from intermixture with the blood of distant breeds.

What is a breed in live-stock ?

A breed in live-stock is a family of animals possessing similar properties distinct from other families of the same race.

In what does symmetry consist in live-stock ?

Symmetry in live-stock is a balanced proportion between different parts of the body of the same animal.

What are the balanced proportions which constitute symmetry ?

A balanced proportion in the body of an animal consists in having the fore and hind quarters the same in length, breadth, thickness, and weight.

What constitutes beauty in live-stock ?

Beauty in live-stock is indicated by a small head ; regular features distinctly marked ; countenance pleasing ; eyes large, full, and clear ; ears erect, large, and thin ; muzzle tapering ; back straight ; ribs round ; tail perpendicular ; skin loose and soft ; limbs short, fine-boned, and flat ; joints large.

What is a disposition to fatten, or yield milk, in live-stock ?

When cattle or sheep put on a larger quantity of flesh and fat, or give a larger quantity of milk, with the smallest quantity of food, they evince the greatest disposition to fatten, or to give milk.

Are properties of blood, symmetry, beauty, disposition to fatten, and to give milk, reproducible in the young ?

Blood, symmetry, beauty, disposition to fatten, and to yield milk, are hereditary, as well as colour, temper, and tendency to disease.

DRAFTING LIVE-STOCK.

When are live-stock drafted ?

Live-stock are drafted when old, or when indicating properties not desirable to propagate.

How are drafted animals distinguished from others ?

Drafted animals are distinguished from others by marks.

How are live-stock marked ?

Marks consist of holes, slits, or notches in the ears, or of letters stamped on the sides or horns, or with keel or ruddle.

Holes, slits, and notches in the ears are made with a punching-nipper and a knife.

Brands are made on the sides with letters dipped in tar, and also burned upon the horns and even skin, with a stamp.

Of what use are marks upon cattle and sheep ?

Marks identify animals when they go astray. Marks indicate individual animals possessing particular properties and pedigree.

BARE-FALLOWING.

Ought all the land of a farm to bear a crop every year ?

It might do so ; but where very strong clay-soil occurs, which is not well adapted for green crops, and where sufficient manure at a time may not be found on the farm, bare-fallowing becomes necessary ; and also where the soil is comparatively foul with weeds, it requires bare-fallowing to clean it.

How is bare-fallowing conducted ?

Fallowing always succeeds a grain crop. The stubble is

ploughed in winter ; cross-ploughed in spring ; harrowed, weeds removed, grubbed, manured in summer ; ploughed, sown with wheat in autumn, to be reaped the following year.

Is other manure used with farmyard on bare-fallow ?

Lime is used at times. Lime is spread upon the feered ridges, and harrowed in, or put in heaps upon them, slaked, and harrowed in, before the farmyard manure is laid on and spread, and the seed-furrow ploughed.

Does fallow wheat-land receive any peculiar finishing ?

Open furrows between the ridges are water-furrowed. Channels are cut with the spade across small hollows in the ridges, and across the lower head-ridges, to allow rain to run off more easily into the ditches in winter.

THE HARVEST.

What is regarded as the period of harvest ?

The operations of reaping and securing grain-crops constitute the harvest.

How is the reaping of grain-crops conducted ?

Grain-crops are reaped by hand, with the sickle or scythe, or by reaping-machines.

How is reaping done with the sickle ?

Reaping with the sickle is done in two ways—reaping by wages, and reaping by piece.

Fig. 37.



Reaping by Wages.

a a are two ridges of corn, with three reapers on each. The middle reaper makes the bands.

b is a band laid down to be filled with corn.

c is a band filled with corn, ready for binding into a sheaf.

d is the binder of sheaves going to set up a stook *e*.

e are the first two sheaves of a stook set up on one of the ridges.

A full stook contains fourteen sheaves of wheat, and twelve of barley and oats. Sheaves in a stook are set two against each other. Hood-sheaves upon the top of the standing sheaves are not now used except in very wet weather.

By piece, stooks are made of the full number of sheaves.

By wages, stooks are made of any number of sheaves.

How is reaping by wages conducted ?

Reaping by wages is done by placing six reapers, men or women, or both men and women, on two ridges, three on each ridge, of whom the one in the middle makes the bands, and all three reap the corn along the ridges, and lay it into the bands.

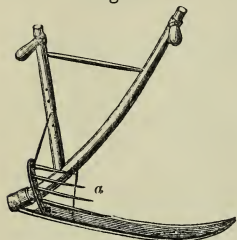
What is done with the corn in band ?

A seventh person, the binder, binds the corn into sheaves with the bands, and sets up the sheaves into stooks or shocks, upon one of the ridges.

How is reaping by piece conducted ?

By piece, a ridge is given to each reaper, who makes the bands, and cuts down the corn. By piece, reaping is estimated by the thrave of two stooks. By piece, corn is also reaped by the acre, the contractor reaping it as he pleases, and binding and stooking. In thraving, either a binder sets the sheaves into stooks, or the reaper binds the sheaves and stooks.

Fig. 38.



Cradle-Scythe for Mowing Corn.

How is reaping done with the scythe ?

Three or fewer mowers with scythes form a set, and cut down the corn, along or across the ridges, as the wind directs.

The blade of a cradle-scythe for mowing corn is set as that of a common scythe, fig. 29, page 36.

The use of the cradle *a* is to keep the corn together as cut by the blade, until the mower lays it in swathe upon the ground.

Who makes bands in scythe-reaping ?

A woman makes bands in scythe-reaping after each mower, and puts the mown corn into them.

Who binds the sheaves, and sets the stooks ?

A man binds the sheaves, and sets the stooks after each mower.

How is a stook set ?

Any number of two sheaves set against each other makes a stook.

What is the hood of a stook ?

Sheaves placed along the tops of others form a hood.

Where are stooks set ?

By the thrave, stooks are set upon every ridge. By wages, and by the acre, stooks are set upon every alternate ridge.

Is corn taken up cleanly from the swathe after mowers ?

Not quite. A raker clears the ground with a large hand stubble-rake after each set of mowers.

Is corn always bound into sheaves when reaped ?

Damp oats are set into gaitins instead of sheaves, and bound into sheaves when removed to be stacked.

In parts of England, barley and oats remain on the ground in swathe, and are removed to be stacked without being bound into sheaves.

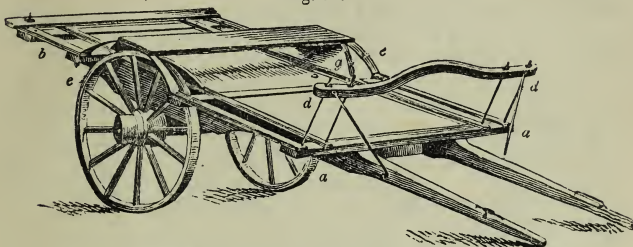
How are sheaves conveyed from the field to be stacked?

Corn is carried from the field, to be stacked, on wheeled carriages.

What are the wheeled carriages for carrying sheaves?

Waggons on four wheels are common in England, and two-wheel carts are used in Scotland, for carrying sheaves.

Fig. 39.



A form of Harvest-Cart for carrying Corn in the Straw from the Field to the Stackyard.

a a b is the body of a cart with its two shafts mounted on the axle of the wheels *e e*.

d d is a front rail, for keeping the sheaves off the horse in the shafts.

g are sides covering the wheels, and supporting a board which projects over them, and upon which the carter stands to empty the cart of its load.

Several forms of carts with two wheels are used for carrying sheaves. A long rectangular cart, with sparred sides and framed top, is common in the south of Scotland. The common cart, with a frame on the top, is common in other parts of Scotland. Waggons with four wheels are more used in England than two-wheeled carts.

The figure gives a safe and convenient form of harvest-cart.

How are sheaves loaded upon a harvest-cart of any kind?

The cart is brought up an open furrow, between two ridges, alongside a row of stooks. A man forks the sheaves to the carter in the cart, who places them with their stubble ends outwards, one row upon another, until a load is made. A rope is thrown across the cart from each corner behind, and secured in front to the shafts.

How are sheaves disposed of from a harvest-cart?

The stacker forms a stool of straw for the stack to stand upon the ground, when no permanent stools are erected in the stackyard. The carter forks the sheaves, one by one, from the cart to the stacker, who builds the body of the stack of a cylindrical form, and finishes it with a conical top.

Are all corn-stacks made cylindrical?

Corn-stacks are built cylindrical, with a conical top, in Scotland. In England, corn-stacks are not unfrequently of an oblong form, with a triangular top.

Is corn in the stack protected?

Thatching of drawn straw is put on corn-stacks, to protect the corn from the weather. Thatch of corn-stacks is kept on with

straw-ropes in Scotland. In parts of England, thatch of corn-stacks is secured with tarred twine and willow withes.

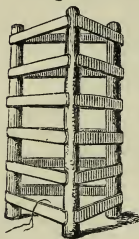
How is a straw-rope made?

A straw-rope is made by one person using a twister, while the spinner, sitting, lets out oat-straw with his hands as the first person moves backwards, to the required length of the rope. The spinner then winds up the straw-rope into a coil.

How are straw-ropes placed upon stacks?

Straw-ropes are put in different fashions upon stacks—lozenge-shaped, net-meshed, and Border fashion.

Fig. 40.



A Prismatic-shaped Boss for preventing Heat in Stacks.

Does corn run any risk in the stack?

Straw of corn is apt to heat in stacks, before moisture has been sufficiently dried out of it.

Has heating a bad effect upon corn and straw?

Heating discolours grain, and imparts a bitter taste to it. Heating rots straw.

Can heating in stacks be prevented?

Heating is prevented by building stacks around frames of wood, which, supporting their tops, relieve pressure upon the parts below.

A pyramidal-shaped boss cannot sustain the weight of the upper part of a stack, because of its upward pointed form.

TUPPING EWES, and BATHING SHEEP.

In a breeding flock of ewes, when is a tup put amongst them?

The tup is put to the ewes in the early part of October. In the hill country the tup is not put to the ewes till November.

How are ewes treated before receiving the tup?

Ewes, prior to being tupped, are put on a piece of fresh rape, or fresh clover aftermath.

Are sheep treated in any particular manner before being put on turnips in winter?

Sheep are bathed. Sheep in the hills are smeared before winter. Bathing and smearing prevent annoyance to sheep from ticks, and injury from scab.

The ked or tick is the *melophagus ovinus* (sheep spider-fly), which burrows its forepart into the flesh or fat of sheep. The scab in sheep is caused by a minute insect, a species of *acarus*, burrowing under the skin.

How are sheep bathed?

Bath is put on sheep while on a bath-stool, by a person pouring it out of a vessel along the sheds of wool opened by the shepherd. Sheep are also bathed by being dipped, back downwards, in a tub of prepared bath, and dripped over another tub.

How are sheep smeared?

Smearing is put on the skin of sheep by the fingers of the shepherd passing along sheds of wool.

LIFTING POTATOES.

When are potatoes taken out of the ground ?

Potatoes are taken out of the ground in autumn, after corn harvest.

How are potatoes taken out of the ground ?

Potatoes are taken out of the ground by hand with a potato-graip. Potatoes are taken out of the ground with the ordinary plough, or with a plough made for the purpose.

How is the potato-graip used in lifting potatoes ?

The potato-graip is used as a spade by a man, who pushes it into the side of the drill, and, on raising the potato-plant, turns up the potatoes to the surface. A woman follows, and gathers up the potatoes in a basket. The basket, when full, is emptied by her into a cart placed near at hand, or into sacks.

How are potatoes lifted with the plough ?

The coulter is removed, because it might cut the potatoes. The plough is entered at one end of a drill, at its side, and turns over the drill, with its contents of potatoes, with the mould-board. Women gather the potatoes in the same manner, and put them into the carts, as after the potato-graip.

Two sorts of ploughs have been constructed for lifting potatoes. One is furnished with a double mould-board, formed of ribs like a brander. The other plough has plain mould-boards, cut short below, and two bars of iron spreading out the width of the drills at an angle upwards as a prolongation of the hind part of the sole-shoe of the plough. Also, a complicated machine disperses the potatoes from the furrow-slice by means of a revolving agitator.

What is done with potatoes after being lifted ?

Potatoes, on being lifted, are stored in pits, which are low triangular piles placed upon a piece of dry ground. A thick layer of straw covers the pits. Earth is put upon the straw with a spade, and beaten smooth.

Are potatoes lifted in any state of weather ?

Potatoes are not lifted in rain or frost.

ROTATION of CROPS.

What is understood by a rotation of crops ?

A certain number of crops of different kinds following in the same order, on the same ground, constitutes a rotation of crops.

Why are different kinds of crops taken in succession on the same ground ?

Because the same kind of crop, requiring the same kind of food, if taken in succession on the same ground, would exhaust the food in that ground, and die for want of it.

Would not manure support a crop on the same ground for an indefinite number of years ?

Manure would support the same kind of crop on the same ground for an indefinite period ; but the food which would support other kinds of crop, would then remain unused in the ground.

Does a rotation of crops secure any advantage to live-stock ?

Where a given number of cattle and sheep are bred upon a farm, a rotation of crops secures their food every year, in quantity and variety.

Is the same rotation of crops followed on all farms ?

A farm situated in the neighbourhood of a town follows a different rotation of crops from one at a distance from a town.

Does the same rotation of crops answer all soils ?

Strong and light soils require different rotations of crops.

What is the ordinary succession of crops ?

The ordinary succession of crops is a green-crop after a grain-crop.

Are grain-crops changed in succession ?

Grain-crops are changed in succession. Wheat, barley, and oats follow on the same ground.

Are green-crops changed in succession ?

Green-crops are changed in succession. Turnips, mangold-wurzel, potatoes, sown grasses, forage-plants, follow on the same ground.

What is a common rotation of grain and green crops ?

A common rotation of crops is, one year of green-crops, as sown grasses ; one year of grain-crops, as oats in Scotland, and wheat in England ; one year of green-crops, as potatoes, turnips, mangold-wurzel, tares, rape ; and one year of grain-crops, as, wheat and barley. This succession is named a four years' rotation.

Can a four years' rotation be modified ?

A four years' rotation is modified by allowing the sown grasses to remain two years, by which a five years' rotation is obtained. By allowing sown grasses to remain three years, a six years' rotation is obtained.

Can a modification of a four years' rotation be effected by grain-crops ?

By taking beans after oats in Scotland, and after wheat in England, followed by a crop of wheat, a rotation of four years is extended to one of six. By extending the sown grasses three years, this six years' rotation is converted into one of eight.

Is there a marked distinction between a rotation of crops on strong and on light soils ?

On strong soil a greater proportion of grain-crops is cultivated than of green-crops. On light soil a greater proportion of green-crops is raised than of grain-crops.

Is a relative proportion between grain and green crops in a rotation desirable ?

Where live-stock is bred and reared upon a farm, the nearer the grain and green crops occupy the proportion each of one-half the arable land, the better for live-stock.

APPENDIX.

THE preceding pages embrace the crops and animals usually cultivated and reared on the arable farms of Great Britain. Other crops are also raised, but being of minor importance are omitted. Works are also performed on a farm, which do not require to be repeated, such as draining, fencing, liming,—on which account it is better to treat them in an Appendix, while others of still less frequent occurrence are omitted altogether, as irrigation, embanking.

DRAINING LAND.

What is the object of draining land ?

The object of draining land is to remove from it all superfluous moisture, that, remaining, would injure the growth of plants.

How is draining of land best attained ?

Draining of land is best attained by making lines of permanent cuts at considerable depths into the subsoil, into which the superfluous water shall find access and flow away.

What is the cause of water remaining in superfluous quantity in the soil ?

Rain falling, finding no channels for descent into the subsoil, remains near the surface until evaporated by the heat of the air.

Does every kind of soil arrest the descent of rain into it ?

No. Porous soils and subsoils allow the rain to descend through them. Light soils and subsoils are porous. Heavy soils and subsoils retain the rain upon them (*see p. 2*).

Do heavy soils alone require draining ?

Light soils upon heavy subsoils require draining as much as heavy soils.

How is land drained ?

Land being in fields, each field is drained by itself. Arable land being in ridges, their direction guides that of the drains.

How is a field drained ?

The surface of every field having an inclination in some direction, drains are made to lead the water to the lowest point of the field.

What is the first operation in draining a field ?

The first operation in draining is to ascertain the direction and amount of fall for the water to the lowest point of the field by a spirit-level, if the eye cannot readily perceive the fall.

What is the next operation ?

The next operation is to ascertain the nature of the subsoil, because it is that which determines the depth and number of drains.

How is the nature of a subsoil best ascertained ?

It is best ascertained by cutting exploratory drains of increasing depth into it, from the lowest to the highest part of the field.

Should there be a minimum depth to every drain ?

No drain should be of less depth than will allow the deepest culture without injury to itself.

What is that minimum depth ?

Subsoil trenching-ploughs go down 20 inches ; the materials filling a drain occupy 6 inches ; allowing six inches between the top of the materials and the bottom of the plough furrow, the minimum depth should be 32 inches.

What says experience on the depth of drains ?

Experience has proved that drains from 3 to 4 feet in depth are required to secure the drying of most soils.

What says experience of the distance between drains ?

Experience has not yet determined the most drying distance between drains of given depth in all sorts of subsoils. In porous subsoils, the drying distance is perhaps not more than 30 feet. In retentive subsoils, it is perhaps not less than 12 feet.

After exploratory drains, how is the draining of a field proceeded with ?

Exploratory drains having determined the depth and distance of drains, a main drain is formed at the lowest end, across the entire breadth of the field, to carry away the drainage-water of the small drains. A main drain is 6 inches deeper than the small drains.

What is done after making the main drain ?

After the main drain is made, small drains are cut from it, at the lowest point of the field, to the upper end in parallel lines, at distances determined by the exploratory drains.

How are drains executed ?

Drains are cut with spades to the requisite depth, as narrow as possible. The conduit for conveying water is placed at the bottom of the drain. Earth is returned above the conduit, and finishes the drain.

Of what material is the conduit of drains ?

The material for conduits is most commonly tiles. Small stones were used before the invention of drain-tiles.

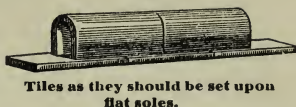
Of what form is a drain-tile ?

Drain-tiles are arched, and are used with separate or attached soles. Tiles with attached soles are pipe-tiles.

How are separate tiles and soles used ?

Separate soles are flat, and placed end to end. Separate tiles are placed upon flat soles, so that the joinings of the tiles shall rest upon the centre of the soles.

Fig. 41.



How are pipe-tiles used ?

Pipe-tiles are of two forms—one a cylinder, the other egg-shaped, with a flat bottom. Cylinder pipe-tiles are placed end to end, and most frequently kept together by means of a collar. Flat-bottomed pipe-tiles are placed end to end without a collar.

Fig. 42.



Fig. 43.



Were it not for its collar, the cylinder pipe-tile would be apt to roll out of the line of conduit. Collars enhance the cost of cylinder pipe-tiles one-half.

Flat-bottomed pipe-tiles stand firm. The egg-shaped opening being small at the lower end, promotes the clearing of sand or mud, and its broad upper end affords room for a larger quantity of water when it comes.

The form and size of the bores of pipe-tiles vary considerably.

How is earth returned into drains upon the tiles ?

Part of the earth is put in with the spade, and the remainder with the plough.

How are bogs drained ?

Drains in bog are cut to a certain depth, and then left for the bog to shrink. Another depth is then cut down, and the bog again left to shrink. At length the bottom of the drain is cut out at the required depth.

With what material are drains in bog filled ?

The peats which had been cast out with the spade in the first and second cuttings having become hard by exposure to the air, are returned into the drain as the material for filling it.

How are drains in upland pasture made ?

Drains in upland pasture are made of two forms,—one open, the other covered. Both are sheep-drains.

How are open sheep-drains made ?

The turf is cut with the spade to the breadth of the drain, and placed upon its side, with the grassy face outwards, on the lower edge of the drain. The soil taken from the bottom of the drain is thrown upon the top of the turf, to be afterwards sown with grass seeds.

How are covered sheep-drains made ?

A thick turf is taken out with the spade, of the breadth of the drain; earth is then taken out to form the bottom of the drain in a narrow channel; the thick turf is replaced where it grew.

How is upland pasture drained for cattle?

Covered tile-drains are best adapted for upland pasture for cattle.

Is draining executed at all seasons of the year?

Winter is the best season for draining hard lands, when the ground is soft, and the fields unoccupied by labour and live-stock. Bogs are best drained in summer; and so are very wet subsoils.

THORN HEDGES.

Of what use are thorn hedges?

Thorn hedges make an efficient fence for the fields of a farm.

What is the best arrangement for making a thorn hedge?

Three men—the hedger and two men—is the best number for making a thorn hedge. The tools they use are—common spades, a ditcher's shovel, a hand-pick, and a garden line.

How is a line of hedge laid off?

A straight line of hedge is laid off with feering-poles, and the garden line stretched along the line of feering-poles. A rut with a spade marks the line of hedge. A curved line for a hedge is marked out with pins.

How is the ground prepared for thorn plants?

The upper soil is removed with the spade by the two men across the breadth of ditch, along the line of hedge, and made a thorn bed by the hedger.

Is a thorn-plant prepared for planting?

Yes. Its stem is cut over with a knife about 6 inches above the roots, and the longer roots are cut short, preserving the fibres.

How is a prepared thorn-plant placed in its bed?

The bed for the thorn plant has an inclined surface upon which the stem of the plant is laid by the hedger, with the roots away from the ditch. The two men follow, and heap upper soil upon the laid plant from the ditch. The hedger then treads the earth firm over the plant, and smoothes the face of the bed with the ditcher's shovel.

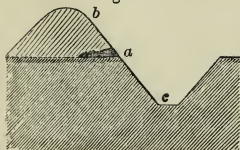
What is done next?

While the hedger is employed in finishing the thorn bed, the two men are employed with the subsoil in the ditch, one loosening it with the hand-pick, the other throwing it upon the top of the thorn bed with the spade.

What does the hedger do after finishing the thorn bed?

The hedger then follows the men, and shovels the loose subsoil upon the top of the thorn bank, and claps the face of the thorn bank smooth with the shovel, and finishes the hedge-planting.

Fig. 44.



Section of Hedge-Bank and Ditch finished.

- a the thorn plant in its bed.
- b the finished hedge-bank.
- c the finished hedge-ditch.

What is the best season for planting thorn-hedges?

Thorn-hedges are planted from the end of autumn till the middle of spring. In rainy weather and hard frost, planting of thorns is deferred.

Are there other modes of planting thorns than laying them in beds?

Thorn plants prepared as above, are planted upright in the soil, and where the soil is deep and subsoil dry the plants grow rapidly.

How is a young thorn-plant treated?

A young thorn-plant is not pruned, and is allowed to grow till it has established a large quantity of roots and leaves, when the points of the most forward branches are lopped off with the switching hedge-bill.

How is a young thorn-hedge protected?

A young thorn-hedge is protected with a wooden paling of two or three rails, according as it is desired to fence off cattle or sheep.

When does a thorn-hedge become useless as a fence?

A thorn hedge, allowed to grow until it becomes bare near the ground, is useless as a fence for sheep, and should be breasted over, or cut down to the ground.

How is a full-grown thorn-hedge breasted over?

The hedger, standing upon the face of the ditch, below the root of the hedge, with his back to the hedge, cuts, in a back-handed stroke, with a hedge-bill in his right hand, through the stems in an upward direction, about two feet from the ground, and lays the cut-off thorns upon the edge of the ditch.

How is an old thorn-hedge cut down to the ground?

The hedger, standing upon the ditch face, below the root of the hedge, and facing it, cuts through with both hands, with an upward stroke of the hedger's axe, the thick stems of the thorns close to the ground, and lays the cut thorns on the edge of the ditch.

Is any use made of cut thorns?

Cut thorns are used in making a dead hedge as a temporary fence, to protect a new hedge, a breasted hedge, or to separate two parts of a grass field.

What is the best mode of weeding young thorn-hedges?

Weeds are taken away from the face of the ditch by the hedge with a hedge-spade. Weeds are removed from the hedge bank by women, with a Dutch hoe, into the ditch.

Does the bank of a thorn hedge ever decay?

In weeding a young hedge in summer, the earth is taken away from the bank into the ditch. When a hedge is breasted over, or cut down, the earth is replaced below and around the roots of the hedge, and upon the bank. This process is named water-tabling.

DRY-STONE WALLS.

Is a dry-stone wall a good fence for fields?

Dry-stone wall makes an efficient fence for fields.

How are lines of dry-stone walls set off?

Lines of dry-stone walls are set off with feering-poles, and fixed by stakes driven into the ground.

What is the best stone for building a dry-stone wall?

The body of a dry-stone wall is best built with flat stones having a rough surface. The foundation of a dry-stone wall is best formed of large stones, as boulders.

Of what construction is a dry-stone wall?

A dry-stone wall may be either single or double. A single dry-stone wall is built against a bank of ground, with one face. A double dry-stone wall has two faces, and stands by itself. Double dry-stone walls are most common fences for fields.

How are stones laid down for a dry-stone wall?

Stones for a double dry-stone wall are laid down by cart-loads along each side of the line.

How is a dry-stone wall best constructed?

One dry-stone builder is sufficient for a single dry-stone wall. A double dry-stone wall is best built by two builders, one opposite to the other.

How are stones placed in a dry-stone wall?

Large stones are placed in the foundation, which has been cast out, and flat stones are laid horizontally upon them, so as to break band with those above and below—the heart of the wall being well packed with smaller stones. Thorough-band stones afford security.

What constitutes the parts of a dry-stone wall?

A dry-stone wall consists of a body, a flat cover, which protects the top of the body, and a coping of stones set on edge upon the cover.

What is the usual height of a dry-stone wall?

An ordinary dry-stone wall is usually 3 feet in height in the body. A cope stands 1 foot in height. A dry-stone wall is altogether 4 feet in height. A dry-stone wall as a march fence is not less than 5 feet in height.

IMPROVEMENT of WASTE-LAND.

How is waste-land most effectually improved?

The first step to the effectual improvement of waste-land is thorough-draining. (See p. 55.) The second step in the improvement of waste-land is deep-ploughing.

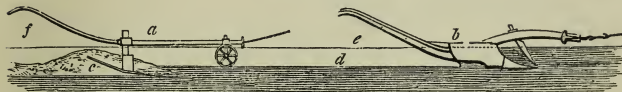
How is deep-ploughing effected?

Deep-ploughing is effected by a combination of trench and subsoil ploughings (pages 5 and 6).

How are trench and subsoil ploughings best effected?

The Tweeddale trench and subsoil-trench ploughs effectually stir and mix the soil and subsoil to the depth of 20 inches.

Fig. 45.



Tweeddale Trench and Subsoil-Trench Ploughs deep-ploughing land.

b is the trench-plough going before with four horses, and turning over a furrow of 15 or 16 inches in depth *e d*.

a is the trench-subsoil-plough following in the same furrow, with four horses, and going from 4 to 6 inches deeper than the trench-plough *b*, making the furrow from 19 to 22 inches in depth,

and mixing the subsoil with a portion of the upper soil by means of its share and tail-board *c*.

e d is the depth of the furrow made by the trench-plough *b*.

f c is the depth of the furrow made by the combined action of the trench and subsoil-trench ploughs *a* and *b*.

Describe the combined action of the Tweeddale trench and subsoil-trench ploughs.

The Tweeddale trench-plough goes before with four horses and two men, and breaks up the land to the depth of 15 or 16 inches, with a rectangular furrow-slice of that thickness, and 14 inches in breadth. The subsoil-trench-plough follows in the same furrow with four horses and two men, and stirs the subsoil 16 inches in breadth, and from 4 to 6 inches deeper than the trench-plough, mixing it, at the same time, intimately with a portion of the upper soil.

What is the immediate effect on the soil and subsoil by the combined action of the Tweeddale trench and subsoil-trench ploughs?

The immediate effects of the Tweeddale trench and subsoil-trench-ploughs are, first, effectually to pulverise both soil and subsoil to a depth of 20 inches on an average; secondly, to mix the subsoil intimately with a part of the upper soil; and lastly, to leave the top of the upper soil unmixed.

Are any obstructions met with in deep-ploughing land?

Boulder-stones are met with at different depths and of different sizes in deep-ploughing land. Boulder-stones are removed when met with in deep-ploughing.

What is the state of the upper soil after Tweeddale deep-ploughing?

The upper soil of Tweeddale deep-ploughed land is at once ready to be prepared for any crop, whether a grain or green crop.

Is Tweeddale deep-ploughing applicable to arable as well as to waste land?

Tweeddale deep-ploughing is equally applicable to arable as to waste land. If it has been first employed on grass land, the first

crop should be oats, to reduce the turf. If first on bare land, the soil may be prepared at once for turnips.*

LIMING.

When is lime used upon land?

Lime is used on land either in bare-fallow or with a green-crop fallow.

When is lime used in bare-fallow?

Lime is laid upon bare-fallow land immediately before the wheat is sown in autumn.

When is lime used in green-crop fallow?

Lime is laid upon land after a green crop, immediately before the grain crop is sown in spring.

Is lime given to different kinds of soil in the same quantity?

No. Strong soils receive more lime than light soils.

Is lime given to the same kind of soil in definite quantities?

The quantity of lime given to the same kind of soil differs much in different parts of the country.

Fig. 46.



A Frying-pan Shovel.

In what state is lime laid upon land?

Lime is laid upon land, either in small heaps in the state of shell, along feered ridges, and spread when in a state of powder, or spread along feered ridges in the powdered state, with frying-pan shovels, from the cart.

A frying-pan shovel is of very convenient form for spreading any substance in a state of powder, or for shovelling clean the bottom of heaps.

Why should lime be applied in the state of powder?

Because it mixes most intimately with the soil in that state.

How does lime operate upon soil?

Lime acts both mechanically and chemically upon soils. Lime acts mechanically in pulverising strong clay soils. Lime acts chemically on soils which contain much vegetable matter.

Does lime act as a manure in the soil to plants?

Lime, by its action on vegetable and acid substances in the soil, converts them into manure for plants.

Is lime given frequently to the same soil?

Lime is commonly given to land in large quantity, at long intervals of time. It is recommended to give lime to land frequently, and in small quantity at a time.

* A particular account of the Tweeddale deep-ploughing will be found in my small volume on *Yester Deep Land-Culture*, published by W. Blackwood and Sons.

FLAX.

Is flax commonly cultivated on farms?

Flax is little cultivated in England and Scotland, but largely in Ireland.

How is the cultivation of flax conducted in spring?

Land is pulverised very fine for flax. Land is rolled smooth before flax-seed is sown. Flax-seed is sown broadcast, very thick, and covered with very little earth.

How is the culture of flax conducted in summer?

Flax-plants, while young, are weeded by hand.

How is flax reaped?

Flax is pulled up by the roots with the hand. Flax-seed is rippled from the straw. Flax-straw is dried in the air, tied into sheaves, and stacked.

Is fresh flax ever steeped in water?

Flax, as pulled, is rippled, tied into bundles, and also put into water to steep; after which it is spread upon grass to dew-ret and dry. Breaking and scutching the flax-straw, after being dried, converts it into flax.

How is flax rippled of its seed?

A rippling-comb, for separating bolls of flax-seed from the straw, consists of a row of sharp-pointed steel needles set upright upon a board. Flax, as pulled, is combed through the ripples, when the bolls separate from the straw.

What is done with bolls of flax-seed?

Bolls of flax-seed are dried, and the seed thrashed out for use or sale.

Is any use made of flax bolls with their seed?

Bolls of flax-seed are good food for cattle. Flax-seed is a rich food for cattle.

How is fine flax obtained?

Fine flax is obtained by growing the crop very thick, and pulling it while still a little green.

How is fine flax-seed obtained?

Fine flax-seed is obtained by growing the crop very thin and branchy, and allowing the seed to ripen fully.

Does flax bear manuring?

Manure causes flax to grow coarse and tender. Flax is never manured, but a top-dressing of bone-dust upon the young plants makes the flax finer.

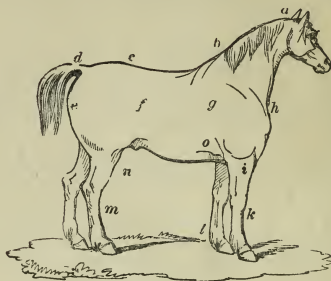
Does flax interfere with a rotation of cropping?

If flax is raised after a grain-crop, it is of good quality, but it exhausts the ground. If flax is raised after grass, it is good, but it then comes into direct competition with a grain crop. If flax is raised as a green crop, it is coarse on account of the manure.

What sort of soil is best suited to flax?

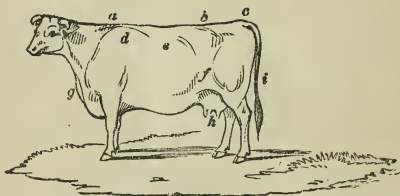
Flax may be cultivated on any sort of soil but peat and gravel.

GOOD POINTS of LIVE-STOCK.



Of a Draught Horse.

The head *a* small; a fine crest from *b* *h* to *a*; limbs *k* *l* *m* tapering, broad, flat, and strong; shoulder sloping from *h* to *b*; withers at *b* thin and high; back *b* to *c* short; chest *b* to *o* deep; top *c* to *d* rounded; flank *c* to *n* deep; hind quarter *e* to *f* long; shoulder muscle at *g* flat and broad.



Of a Short-horn Cow.

Back straight *a* to *c*; hook-bones level and broad at *b*; tail-head level at *c*, tail perpendicular by *i*; filled out behind the shoulder at *d*; ribs round at *e*; flanks deep *b* to *f*; brisket prominent at *g*; udder *h* finely quartered; horns fine and pointed.



Of a Leicester Ewe.

Head long and narrow; fine muzzle; prominent eyes; long, broad, thin ears. Bone of the leg small, firm, and broad. The body well covered with wool, and rectangular. The counter *g* full; shoulder well filled up at *a*; rib at *f* round; loin at *e* filled up; rump *d* level with the back; flank from *d* to *c* deep as the girth from *a* to *b*.



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